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A STUDY OF INFLUENZA IN BOSTON DURING THE WINTER OF 1940–1941*

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AN epidemic of influenza during the fall and winter months of 1940 and 1941 affected almost every section of the United States. A sharp rise in the incidence of this disease was recorded in California during November, and a peak of about 37,000 cases was reported from the Pacific and Mountain regions for the week ending December 21. The regions of the Southeast presented a maximum of about 58,000 cases during the week of January 11, and the South Atlantic region one of about 50,000 cases in the week of January 25. According to the statement in *Public Health Reports*,[1] "In the East North Central, West North Central and New England regions the disease did not appear until about the middle of January and in the Middle Atlantic region the highest weekly incidence was reported during the week ended February 1st."

The total influenzal morbidity reports as given by *Public Health Reports* for New England for the period from December, 1940, through March, 1941, are assembled in Table 1. These data suggest that the outbreak in New England became evident suddenly, rapidly attained a maximum about the middle of January, and subsided abruptly.

It will be noted that no figures for Massachusetts are included in the table, since in this state the disease is not reportable. Recorded deaths, however, from influenza in Boston were 4 in December, 22 in January, 11 in February and 4 in March. The following statement, moreover, has been published: "It was reported January 11 that 18,000 school children in Boston were ill with a mild form of the disease. Classes had been suspended in Salem, Haverhill and Gardner, Massachusetts."[2] During January, the average daily attendance of 134,000 grammar-school and high-school children in Boston decreased 8 per cent, as compared with the records for December and February.[3] Reportable communicable diseases were not unusually prevalent during this period.

TABLE 1. *Number of Cases of Influenza Reported in New England, December, 1940, through March, 1941.*

FOR WEEK ENDING	MAINE	NEW HAMPSHIRE	VERMONT	CONNECTICUT	RHODE ISLAND	TOTAL WEEK	TOTAL MONTH
December 7	2	0	0	2	0	4	
December 14	7	0	0	6	0	13	
December 21	3	2	0	2	1	8	
December 28	24	0	0	1	0	25	50
January 4	40	0	99	10	0	149	
January 11	1345	1000	76	111	31	2563	
January 18	1421	1000	81	1718	16	4236	
January 25	1138	44	23	1869	29	3103	
February 1	197	27	128	623	23	998	11049
February 8	63	5	26	317	10	421	
February 15	112	0	0	90	1	203	
February 22	11	16	0	63	0	90	
March 1	28	10	0	62	2	102	816
March 8	6	8	0	26	0	40	
March 15	1	3	0	4	0	8	
March 22	0	3	0	6	0	9	
March 29	1	0	0	8	2	11	68

During the outbreak in Boston, clinical and laboratory studies of respiratory illnesses occurring in two groups of adults, some of whom had been vaccinated against influenza, were carried out. In addition, serums from certain pneumonia patients entering a large city hospital throughout this period were examined serologically. The findings are described in this communication.

METHODS

The two groups selected for study consisted of 404 students at the Harvard Medical School and 558 members of the personnel of the Boston City

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Hospital. Approximately half the former group received, on January 6, the "complex chick-embryo vaccine" (canine-distemper virus and influenza A virus).[4] About two fifths of the latter group were given this vaccine on January 8. Serums were taken immediately before the administration of vaccine, and four weeks later from the vaccinated and nonvaccinated medical students. Serums were

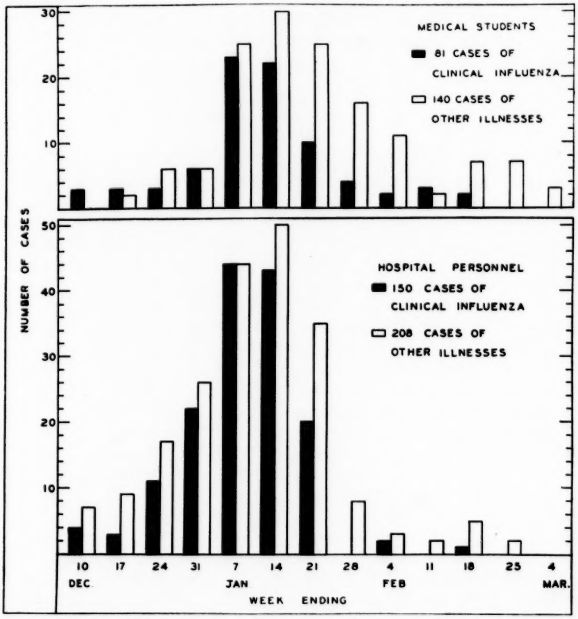

FIGURE 1. *Distribution of Cases of Clinical Influenza and Other Illness in Hospital and Student Groups According to Time of Onset.*

taken from the hospital group at the time of vaccination and again three weeks later. Complement-fixation tests with influenza A virus as antigen were carried out on all these serums, and, as previously mentioned, on certain serums from cases of pneumonia in the Boston City Hospital. The technic employed was similar to that of Eaton and Rickard.[5] To 0.25 cc. of serum was added 2 units of complement, saline to a total volume of 0.75 cc. and 0.25 cc. of antigen (a 2 per cent suspension of mouse lung infected with influenza A virus [Strain PR 8]*). After incubation at 37°C. for one hour, 0.5 cc. of 2.5 per cent sheep cells sensitized with 2 units of amboceptor was added and incubation continued for forty-five minutes. Final readings were taken after overnight storage in the refrigerator. The test was considered significant when the titer of the second serum specimen was four or more times greater than that of the first serum taken. Complement-fixation tests[6] on some of the same serums, using influenza B virus (Lee strain),* were carried out by the same procedure, except that a 5 per cent suspension of infected mouse lung was used as antigen. Serums known to be positive were included as controls in all tests, as well as normal mouse lung (2 or 5 per cent suspension) and the usual serologic controls.*

The titer of a serum was recorded in terms of its final dilution in the volume of fluid present before the addition of the sensitized cells. The end point was taken as the dilution of serum that gave complete fixation in a final dilution of 1:16 and slight fixation in higher dilutions. Certain

*We are indebted to Dr. Frank L. Horsfall, Jr., Rockefeller Foundation, New York City, for the influenza A virus and positive serums, and to Dr. Thomas Francis, Jr., New York University College of Medicine, New York City, for the influenza B virus.

investigators have expressed the titer in terms of the original dilution of the serum. Although we should like to adhere to this practice for the sake of conformity, it is evident that this makes it impossible to compare satisfactorily the results of different investigators unless comparable concentrations of reagents are universally employed.

Influenza A virus was isolated by the intranasal inoculation of ferrets with throat washings obtained from patients. With material from infected ferrets, mouse passages were initiated.

Virus neutralization tests in mice were done with serums of 2 cases from which virus was recovered; 0.05 cc. of a mixture of equal parts of infected mouse lung (1:1000) and dilutions of serum was inoculated intranasally. The neutralization titer of the serum was expressed in terms of its final dilution.

Cross-neutralization tests in mice were carried out with immune rabbit serums prepared by the single intraperitoneal inoculation of 10 to 12 cc. of a 10 per cent suspension of the lungs of mice infected with the several strains of virus examined. The rabbits were bled ten to seventy-two days following injection.

The persons studied were classified under three headings, according to the clinical history. Under "clinical influenza" were included all those who gave a history of illness characterized by sudden onset, fever above 99°F. and constitutional symptoms such as weakness, and muscle, bone or joint pains. Under "other illness" were assigned those who had any illness of the respiratory tract other than clinical influenza, as characterized by all the foregoing criteria, or of an ill-defined nature. Under "no illness" were listed those who had no illness during the period of observation.

In both the student and hospital groups, serologic data secured for the month of January are presented. The students returned to school on January 3, after the Christmas recess. A few had been ill either in Boston or elsewhere during the recess, and were accordingly excluded from the serologic study.

Results

Figure 1 presents by weeks the number of cases of clinical influenza and other illness in the hospital and student groups for the period of three months, according to the time of onset. The distribution of cases according to the clinical classification is similar. In the hospital group, 90 per cent of the cases of clinical influenza and 80 per cent of the cases of other illness occurred from December 17 to February 1. For the student group, the figures are 79 and 66 per cent, respectively. The peak of maximum illness in both classes occurred about the middle of January. There is thus a suggestive chronologic parallelism between the incidence of influenza and other respiratory illness.

The incidence of illness during January is presented in Table 2. It is evident that about half the patients in each group were ill, and that in about one sixth of both groups these illnesses were diagnosed as influenza.

The results of complement-fixation tests for influenza A virus with serums from the student and hospital groups are given in Table 3. On the assumption that a fourfold rise or more in titer of complement-fixing antibodies indicates recent influenzal infection,[5] 18 per cent of the nonvaccinated group had had recent contact with this strain of virus. Thirty-five (22 per cent) of the 158 in this group showed titers of 1:64 or higher. Seven nonvaccinated and 4 vaccinated persons having clinical influenza experienced no rise in titer. Three of the former had initial titers of 1:64.

In none of these 11 cases was a rise in complement-fixation titer for influenza B virus demonstrated, yet clinically the illnesses could not be distinguished from those in cases that revealed

Table 2. *Incidence of Illness in Medical Students and Hospital Personnel during January, 1941.*

Illness	Medical Students		Hospital Personnel	
	No. of cases	Per cent	No. of cases	Per cent
Clinical influenza	58	14	108	19
Other illness	125	31	137	25
No illness	221	55	313	56
Totals	404		558	

Table 3. *Results of Complement-Fixation Tests for Influenza A Virus.*

Group and Diagnosis	No. Rise in Titer		Fourfold or Greater Rise in Titer		Totals
	No. of cases	Per cent	No. of cases	Per cent	
Medical students					
Vaccinated group	90	53	81	47	171
Clinical influenza	2	1	19	11	21
Other illness	27	16	34	20	61
No illness	61	36	28	16	89
Nonvaccinated group	128	81	30	18	158
Clinical influenza	7	4	13	8	20
Other illness	36	23	10	6	46
No illness	85	54	7	4	92
Hospital personnel					
Vaccinated group	11	25	33	75	44
Clinical influenza	2	5	13	29	15
Other illness	1	2	2	5	3
No illness	8	18	18	41	26

In none of these 11 cases was a rise in complement-fixation titer for influenza B virus demonstrated, yet clinically the illnesses could not be distinguished from those in cases that revealed

a significant rise in titer for influenza A virus. Moreover, all the serums from the 44 persons in the vaccinated group at the hospital, together with those from 82 pneumonia patients in the same institution, were tested for complement fixation with influenza B virus. None exhibited a rise in titer, although 4 had titers (1:64) above 1:16. These findings suggest that influenza B virus in all probability played no etiologic role in the groups studied.

About one fifth (10) of the 46 nonvaccinated persons having other illnesses showed significant rises in titer. All but 3 of these, however, had symptoms of clinical influenza, but no temperatures were recorded. It is noteworthy that about 8 per cent (7) of the 92 nonvaccinated persons with no history of illness also had serologic evidence of a reaction to influenza A virus.[5]

Vaccination alone seems to increase complement-fixation titers in certain persons, as shown by comparisons between the vaccinated and nonvaccinated groups as a whole and between the various clinical classifications (Table 3). For example, 47 per cent of the vaccinated group of medical students exhibited a fourfold rise or more in titer compared with 18 per cent in the control group. In the vaccinated group of students who had no illness, 16 per cent showed rises, whereas in only 4 per cent of the corresponding class in the nonvaccinated group did similar changes occur. The high incidence of increases in titer found for the class with no illness at the hospital, as contrasted with that for the corresponding class in the medical-student group, may possibly be accounted for by the probable greater chance of exposure in the institution, which would tend to a larger number of inapparent infections.

Clinical Aspects

A review of 50 case histories of the students with clinical influenza revealed that all but 2 had a sudden onset, and a fever (100 to 102°F.) lasting three days was common. A few had temperatures as high as 104°F. The duration of fever did not exceed four days. Headache, muscle or joint pains and sore throat were characteristic complaints. The acute symptoms usually subsided with the fever, or one to two days later. The majority developed coryza and a cough that usually was not productive and persisted one to two weeks. Weakness was a major complaint and lasted more than one week in about half the cases. Thirteen students were hospitalized. Complications occurred in only 1 patient, who developed otitis media and recovered.

The duration of illness, as indicated by absence from duty in 117 cases of clinical influenza in the hospital group, is shown in Table 4. In 40 per cent, disability lasted over one week, and in 9 per cent over two weeks.

Of 358 persons in the hospital group with clinical influenza (150 cases) or other illnesses (208 cases) during December through February, 7 cases of pneumonia and no deaths occurred. Three of these complicated influenza, of which one was severe. One other patient had a Type 8 pneumococcus in the sputum. Bacteriologic examination of the sputums of the other patients did not reveal any organisms responsible for the pneumonia. Unfortunately, no serums from these patients were available for study.

Table 4. *Duration of Illness with Clinical Influenza in Hospital Group, December, 1940, through February, 1941.*

Days Absent from Duty on Account of Illness	No. of Cases	Per Cent*
0–4	21	18
4–8	53	45
8–11	24	20
11–15	10	9
15–22	7	6
More than 21	2	2
Total	117	

*Absent from duty less than 8 days, 63 per cent; absent from duty less than 15 days, 92 per cent.

Serums from a number of patients with pneumococcal pneumonia admitted to the Boston City Hospital from December through April were available for study. These serums had been collected at random, primarily for studies in pneumococcal immunity by Dr. Maxwell Finland and his associates. From each patient, however, a typable pneumococcus was obtained by culture of the sputum, throat swab or blood. In addition to the various types of pneumococci (Types 1, 2, 3, 4, 5, 7, 8, 14, 18 and 19), cultures of the sputum or throat yielded in some cases alpha-hemolytic streptococci, *Haemophilus catarrhalis*, *H. influenzae*, staphylococci or diphtheroids—the usual flora of the respiratory tract.

During the same period, an unusually large number of cases of staphylococcal pneumonia occurred, often associated with clinical influenza or occurring as a complication thereof. Cultures of the sputum or blood from these patients yielded hemolytic *Staphylococcus aureus* as the predominant organism, although in a few patients alpha-hemolytic or beta-hemolytic streptococci or *H. influenzae* was also present in the respiratory tract. Details of the clinical features of these patients have been reported by Finland, Strauss and Peterson.[7]

Serums from a few of the cases of staphylococcal

pneumonia, together with all those from the cases of pneumococcal pneumonia, were tested for complement fixation with influenza A virus. In certain cases, there was only a single specimen, and in others several specimens obtained over a period of more than a month were examined.

The results are given in Tables 5 and 6. The high incidence of complement-fixation titers of influenza A virus. The first specimen of these pairs of serums was obtained less than ten days, and the second more than fourteen days, after the onset of illness. One of these cases occurred in April, well after the influenza outbreak had subsided. Of the 9 patients with staphylococcal pneumonia, 3 showed rises and 3 showed decreases in titer that were considered significant.

TABLE 5. *Results of Complement-Fixation Tests for Influenza A Virus with Serums of a Group of Pneumonia Patients Admitted to the Boston City Hospital from December, 1940, through April, 1941.*

MONTH	TYPE OF PNEUMONIA*	HIGHEST COMPLEMENT-FIXATION TITER FOUND IN SERUM							TOTAL NO. TESTED	TITER <1:64	TITER OF 1:64 OR HIGHER	TITER OF 1:64 OR HIGHER
		<1:16	1:16	1:64	1:128	1:256	1:512	1:1024		NO. OF CASES	NO. OF CASES	PER CENT
December	S	1	0	0	0	1	0	0	2	1	1	
	P	5	3	0	0	1	1	0	10	8	2	20
January	S	0	1	0	3	1	2	0	7	1	6	86
	P	2	3	2	2	3	3	1	16	5	11	69
February	P	2	7	3	2	0	1	0	15	9	6	40
March	P	5	10	8	2	0	0	0	25	15	10	40
April	P	3	8	4	1	0	0	0	16	11	5	31
Totals	S	1	1	0	3	2	2	0	9	2	7	78
	P	17	31	17	7	4	5	1	82	48	34	42
	All	18	32	17	10	6	7	1	91	50	41	45

*S = staphylococcal pneumonia; P = pneumococcal pneumonia.

1:64 or more (34 of 82 patients, or 42 per cent) is suggestive of a recent reaction to this virus. This high incidence is particularly evident in the staphylococcal group (7 of 9 patients, or 78 per cent); one patient, whose serum had a titer of

TABLE 6. *Results of Complement-Fixation Tests with Serums of Selected Pneumonia Patients.**

DATE	CASES WITH NO CHANGE IN TITER	CASES WITH FOURFOLD OR GREATER RISE IN TITER	CASES WITH HIGH INITIAL TITER AND LATER SIGNIFICANT DECREASE	TOTAL CASES
December	4	1	0	5
January	0	3†	3†	6
February	1	2	0	3
March	6	1	0	7
April	5	1	0	6
Totals	16	8	3	27

*Two samples tested, of which the first was taken ten days or less and the second fourteen days or more after the onset of illness.

†Cases of staphylococcal pneumonia.

1:16, died, and the presence of influenza A virus was presumptively demonstrated in the lungs.*

Eight of 24 serums from the pneumonia cases for which two samples were available showed a significant rise in complement-fixation titer for

*A ferret inoculated intranasally with a suspension of the lung of this patient developed no signs of infection, but proved refractory to subsequent inoculations with influenza A virus (Strain PR 8). The ferret's serum taken prior to the second inoculation protected mice against infection with this strain of virus.

As previously stated, complement-fixation tests with influenza B virus were done on all serums from the pneumonia patients. No rises in titer and no high titers — 3 had titers of 1:64 — were found. Furthermore, no correlation could be established between the type of throat flora and the presence of either a high antibody titer or an increase in titer for influenza A virus in the blood of these patients.

STUDIES WITH VIRUSES ISOLATED FROM THROAT WASHINGS

Two strains of influenza virus were isolated from the throat washings of 2 patients seen on January 3 and January 11, respectively. Ferrets that were inoculated intranasally responded in the first passage with fever and signs of nasal involvement. Ferrets were inoculated in series at intervals of two to five days, turbinates or a mixture of turbinates and lung tissue being used for transfer. All exhibited signs of infection. If only a small quantity of virus was present, however, in the throat washing (for example, after passage through a Berkefeld filter), no sign of infection in the first passage was seen, but when the ferret was allowed to recover, its serum contained neutralizing antibodies, as demonstrated by the mouse-protection test.

The convalescent serums of ferrets recovered from infection with either strain of virus had

high titers of neutralizing antibodies when tested against influenza A virus (Strain PR 8) in mice. In addition, both persons from whom virus was obtained had a significant rise (1:4 to 1:64 and 1:16 to 1:64, respectively) in titer of neutralizing antibodies, as well as a rise in complement-fixation titers when tested with this strain of virus.

Passage of virus from ferrets to mice did not succeed until the fifth and sixth ferret passages. Mice did not die until three mouse passages had been carried out. The virulence of the virus in infected mouse lungs gradually increased. Thus, 0.05 cc. of infected mouse lung of the twelfth passage, diluted 1:1000, was lethal for mice, whereas the same volume of lung suspension from the twentieth passage killed in a dilution of 1:100,000.

The antigenic relations of the two strains of recovered virus and of the influenza A virus (Strain PR 8) were investigated by means of cross-neutralization reactions, with immune rabbit serums prepared against each strain. The results of these tests are not presented in detail. They indicated, however, that antigenic differences existed among the three strains.

Discussion

The epidemiologic, clinical and laboratory findings presented in this paper show that an outbreak of acute upper respiratory disease, studied in Boston during the winter of 1940–1941, was in part due to epidemic influenza. In the majority of cases diagnosed as influenza, influenza A virus appeared to be the etiologic agent. This is based on the following facts: viruses of this type were isolated from the throat washings of 2 typical cases; many patients exhibited rises in complement-fixation antibodies for the influenza A virus following their illnesses; and in a fairly large number of serums, no complement-fixing antibodies could be demonstrated for influenza B virus.

In accordance with the epidemiologic pattern noted in previous outbreaks, the characteristic rapid rise and fall in incidence was observed. Relatively few cases were noted during the last two weeks in December. Increasing sharply to a maximum in the second week of January, the number of cases had by the end of that month again reached a low level of incidence. It is of interest in respect to the problem of the interepidemic persistence of this disease that scattered cases occurred as late as April 1. During the month of January, about half the persons under observation had either influenza or some other illness. Many of these infections, however, were apparently not due to known strains of the influenza virus. This parallelism between influenza and other illnesses may, of course, be attributable to chance, but since similar phenomena have been described by others, it is possible that the same factors responsible for the spread of influenza were operative in that of the undefined infections.

From a clinical standpoint, the uncomplicated disease was in general mild, but otherwise typical of influenza as described in other recent outbreaks.[8–10] In the combined hospital and student groups, only 7 cases of pneumonia occurred during the observation period of three months. Of these, only 3 appeared to complicate clinical influenza.

Examination of serums from 82 patients with pneumococcal and 9 patients with staphylococcal pneumonia revealed that an unusually large number had titers high enough to suggest recent exposure to the influenza A virus. In 27 of these patients, samples of serums were available and were adequate for testing whether or not a close association between the virus and the bacteria was present at about the same time. In 5 of 21 cases of pneumococcal pneumonia, the serologic evidence indicated an associated infection with influenza A virus, and such evidence was obtained in all 6 patients with staphylococcal pneumonia. Although a causal relation between the influenza and the pneumonia has thus not been demonstrated by either clinical or laboratory evidence, it seems possible that in certain of these patients, at least, influenza represented a factor predisposing to the pneumonia.

One of the important objectives, of course, in studies of this kind is to accumulate information that may lead ultimately to means of more certain recognition of the disease. It is therefore pertinent to compare the results obtained in this investigation by means of complement-fixation tests with the clinical diagnosis.

The cases studied during the epidemic period were classified clinically as clinical influenza and other illness. In the unvaccinated student group, it was found that 7 among 20 of those comprising the former class exhibited no increase in complement-fixation titer, whereas 10 among 46 of the latter class showed a significant rise. These findings, then, do not seem to indicate a close correlation between the two methods of diagnosis.

This discrepancy may be attributed to several factors. One of these is the inadequacy of certain of the clinical records. For example, 7 of the patients with other illness who showed rises in titer had all the clinical manifestations regarded as diagnostic of influenza, but their temperatures were not recorded. Had the records been avail-

able, these patients would without much doubt have been included in the influenza group, and thus the percentage of correlation would have been raised from 65 to 74. Then only 3 who showed an increase in titer would have been left in the group of 39 patients with other illnesses, giving a correlation of about 92 per cent between the serologic and clinical diagnoses.

Imperfect recording, however, cannot offer an explanation for the fact that 7 patients in the clinical influenza class apparently underwent a disease typical in all respects of influenza, yet showed no evidence of antibody increase for either influenza A or B virus. This behavior may be accounted for by failure of these persons to produce antibodies detectable by the methods employed, or it may be the result of infection with one or more serologically distinct types of virus, as yet unidentified.

However this may be, at the moment the correlation between the serologic diagnostic test and clinical diagnosis, not only in this study but also in that carried out recently by Dalldorf and his associates,[10] is not so close as one might wish.

The fact that in the nonvaccinated student groups 8 per cent of those having no illness gave serologic evidence of recent contact with influenza A virus is in accord with the figure of 6 per cent in analogous groups recorded by Eaton and Rickard.[5] The epidemiologic role of this sort of patient requires investigation, since he might represent an important factor in the transmission of the virus were his function as a carrier demonstrated.

It should be noted that in this discussion we have confined ourselves to the data obtained in the nonvaccinated group. This was necessary because our findings suggest that vaccination might lead to a fourfold or greater increase in titer of complement-fixing antibodies, thus rendering doubtful the significance of the data obtained in the vaccinated group in respect to the association between rises in titer and clinical diagnosis.

The increase in complement-fixing antibody in certain persons following vaccination is in contrast to the findings of Morrison and his coworkers[11] that repeated vaccination with active chick-embryo virus (influenza A virus [Strain PR 8]) did not induce the formation of this antibody, although neutralizing substances made their appearance.

Our experience with vaccination once again illustrates the futility of attempting to induce active immunity in the face of an outbreak of a disease characterized in its epidemic pattern by sudden appearance and rapid defervescence. Since antibodies do not normally appear before about the seventh day following the onset of illness, vaccination probably would not lead to an effective state of resistance before this time. Indeed, even a longer interval is perhaps required. All but 8 cases of influenza occurred among the vaccinated persons during the two weeks following vaccination. The data therefore do not present a basis for an adequate estimate of the value of the mode of vaccination employed, but it is noteworthy that clinical influenza may occur in persons who have been vaccinated two weeks before the beginning of their disease. In evaluating this fact, however, one must remember that, because of the rise of antibody induced by the vaccine, we could not determine by serologic test whether the etiologic agent in these cases was influenza A virus. Nevertheless, because of the high incidence of nonvaccinated cases due to this agent, the probability is that certain of these patients were infected with influenza A virus.

Dalldorf and his associates[10] have recently analyzed the incidence of influenza A among persons who had received the complex vaccine of Horsfall and Lennette several weeks before their illness. Protection was not evident as a result of vaccination, but the authors believed that complications were prevented.

Although there can be no doubt that the two strains of virus isolated from patients during the epidemic belonged to the group of viruses now designated influenza A, they exhibited differences indicating that they were not identical. Cross-neutralization tests with antiserums prepared in rabbits against these and Strain PR 8 suggested definite though minor antigenic differences. Magill and Francis[12] have described analogous dissimilarities in antigenic composition in various strains of influenza A, and even in those derived from cases in the same epidemic. Our observations, then, add to the evidence for the marked heterogeneity of strains of influenza A, which possibly depends either on the existence of very large numbers of different strains with fixed antigenic properties or on an extreme tendency to variation on the part of a single virus.

Summary

An epidemic of influenza occurred in Boston during December, January and February, 1940-1941, which appeared to be a part of an outbreak extending throughout most of the United States.

In Boston, three groups were studied: medical students, hospital personnel and patients hospitalized for pneumonia.

The uncomplicated disease was mild. Complications were rare among the medical students and

hospital personnel, but in a series of 91 pneumonia patients, serologic evidence indicating that a large number had had contact with influenza A virus suggested a possible relation between the two diseases.

Influenza A virus was isolated from 2 patients and was shown by serologic tests to be the chief etiologic agent in the outbreak.

No evidence for infection with influenza B virus was obtained, although certain patients with typical manifestations of clinical influenza gave no indication of a recent infection with influenza A virus.

The correlation between the clinical and serologic means of diagnosis was incomplete.

Eight per cent of nonvaccinated medical students who had no illness of any sort during the period of observation presented serologic evidence of recent contact with influenza A virus.

Vaccination with the complex vaccine of Horsfall, Lennette and Rickard appeared to induce the formation of complement-fixing antibodies in a certain proportion of persons.

The prophylactic value of this vaccine cannot be determined from the data presented, since vaccination was undertaken at the inception of the epidemic. Eight persons, however, developed clinical influenza two weeks or more following vaccination.

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SYMPOSIUM: THE CONDITIONED REFLEX OF PAVLOV

THE PHYSIOLOGIST'S POINT OF VIEW*

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IT is rather a large undertaking to present the fundamentals of the conditioned reflex or its more complex manifestation, conditioned behavior, in a few minutes. The doctrine of conditioned behavior is a relatively simple one, made up of only a few components but conventionally couched in a rather unattractive terminology. Conditioning can lead to such unexpected, bizarre and apparently illogical results that the hard-headed realist has some difficulty in admitting to himself that it represents sound biology.

To put the matter in everyday terms, I might look up at the ceiling and say, "Ugh." I should expect from that procedure a primary unconditioned reaction,—a look of surprise,—but that would be all. But if I changed the syllable slightly to "dog," I should expect the reaction to be quite different. The second syllable brings up a mental image of the quadruped with fur who barks and becomes odoriferous when he is wet. To that second syllable, most human beings have been conditioned in a variety of ways, the end reaction being mostly mental imagery.

As another example of conditioning, I might guarantee, with two ounces of cellulose and a few grains of coal-tar derivatives, to produce in a man an increased pulse rate, deepening of the respiration and dilatation of the pupils—without having the materials within a hundred feet of the subject. The special circumstances would be that the subject, a lonesome American, traveling abroad, should suddenly come on "Old Glory" floating in the breeze. The conditioning, in this case, would have been due to the various experiences by which the citizen had learned the meaning of the American flag. "Learning" and "conditioning" are but two words for the same process. The learning, however, may include much more than the acquiring of conventional lore. It may

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involve and be expressed by any active process in the body. In the flag example, the response involves smooth, cardiac and skeletal muscles.

The subject of conditioning is conventionally presented in terms that do not seem to mean a great deal. The classic example is ringing a bell and making a dog salivate — a happening seemingly remote from the field of practical pediatrics. However, for delineating the problem, I believe that the Pavlov dog can be profitably brought to the scene again. In Pavlov's earlier studies on the physiology of the digestive system, his experiments had been interfered with a great many times by the so-called "emotional reactions" of his dogs. About 1904, he decided to make a study of these confusing matters, and out of this study grew many years of work on conditioned behavior. One of his earlier procedures was to put some acid on the tongue of a dog and measure the resulting salivary secretion. Then, at the same time that the acid was given, a bell was rung, the procedure being repeated many times. After a while, the ringing of the bell alone caused increased salivation.

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But essentially the same phenomenon is a matter of common experience. Ordinarily, when a man in his study hears the dishes in the kitchen begin to rattle, he is merely annoyed at the distraction. Suppose, however, he has been out skiing and is resting by the fire when he hears the noise from the kitchen; he suddenly realizes that his salivary glands are secreting, as are his gastric glands. So much, then, for conditioning of glandular functions.

Again, a man may be strolling down the street in the evening when a whiff of lilac perfume is wafted on the breeze. His higher brain may have lost all recollection of the pleasant evening in the moonlight years before by which the conditioning was established, but somewhere in the brain the trace has persisted and he reacts with a thrill of pleasure — in this case, perhaps a purely affective response, although with secondary somatic reverberations. Still enjoying the thrill, the man enters his home and sees the new maid looking sweet and attractive and has a little episode with her. The next morning, when the maid serves the breakfast, he gets red in the face. The conditioning this time expresses itself objectively via the vasomotor system.

A classic example of conditioning of still another sort is that of the boy who was given castor oil in canned peach juice. For fifteen years, he could not taste peaches without nausea. But more than that, he also "tasted" castor oil each time. Here the conditioning was perceptual — a falsification of sense impression.

Another often cited case is that of Watson's baby, "Albert."* The baby had had the benefit of a faultless environment up to the time he fell into the hands of the psychologist and had only two fears in the world: fear of loud noises and of falling — with which all babies are born. Watson put the baby on a table and then placed a rabbit beside him. Just as the baby reached for the rabbit, a steel bar was sharply struck behind his head. He started and drew back. The rabbit was brought up again, and just as the baby reached for it, the noise was repeated. This time, the baby drew back and fell on his side. The experiment was renewed. (What the mother was doing in the meantime is not stated.) Finally, every time a rabbit was brought near him, he went into a marked fear reaction: he cried, fell over and could not be induced with any sort of encouragement to touch a rabbit. Not only was he conditioned against rabbits, but his fear was generalized to include any kind of furry object — white rats, kittens, Santa Claus whiskers and so forth.

Such conditioned fears are of widespread occurrence and are of great clinical significance. Very often, the episode that caused the fear is not remembered, and the end result is called a phobia. Such phobias are seemingly utterly illogical, but they are very real and may go far to wreck the life of the patient.

In all the foregoing examples, the conditioning has been accompanied by awareness on the part of the subject. Such awareness, however, is not a necessary feature. By the simultaneous use of a sound signal and a flashlight, the pupils of a man can be conditioned to contract to an auditory stimulus, even when the subject is totally unaware of the purpose of the experiment and despite the fact that one has no voluntary control of the pupils. Unwitting conditioning of involuntary activities is probably a rather common happening.

So much for conditioning of positive responses. It is possible, and the possibility is clinically meaningful, also to set up conditioned inhibitions. For example, a dog may be conditioned to salivate when a point, X, on his skin is touched. He is then trained to discriminate between spot X and another spot, Y. Y becomes a so-called "negative spot." If Y is first stimulated and then X, no sali-

*This case is cited from *The Psychology of Adjustment* (Schaffer, L. H. *The Psychology of Adjustment*. 600 pp. Boston: Houghton Mifflin Company, 1936).

vation occurs: Y has come to mean "do not salivate."

The same experiment can be extended to illustrate the inhibition of conditioned inhibition. While the salivary glands are held in abeyance by stimulation of Y, the introduction of an extraneous stimulus for example, a loud noise — is followed at once by a copious salivary reaction. In everyday life, such happenings as "losing one's head" or "going to pieces" are examples of the inhibition of conditioned inhibitions. Thus, the resentful office boy may be "thrown off his guard" by some unexpected happening, hit his employer and lose his job (also cited by Schaffer).

From the standpoint of therapeutics, perhaps the most significant problem regarding conditioned behavior is how to get rid of it. There are three ways of deconditioning. One is by simple disuse. If the Pavlov dog is subjected for a suitable interval to neither acid nor auditory stimulation, he may finally lose the conditioned reaction; similarly, a child outgrows this or that habit. A second method is by active deconditioning: if the bell is repeatedly rung and no acid is given, it ceases to mean "salivate." The third method is antagonistic conditioning or reconditioning — the baby that is afraid of the rabbit can be exposed to the animal at the same time he is fed or patted by the nurse, so that the rabbit instead of meaning a disagreeable noise gradually comes to mean something pleasant. All three of these methods are capable of clinical application.

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PRACTICAL CLINICAL APPLICATIONS, ESPECIALLY TO CHILDREN*

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BOSTON

ONE usually thinks of Pavlov's conditioned reflexes as referring to gastric juice or salivary secretion. Both are innervated by the autonomic nervous system — reflexes through that chain. Many other functions of the autonomic nervous system are the subject of reflexes that may be conditioned. Many of the glands of the body — the serous and mucous glands of the respiratory, the gastrointestinal and the genitourinary tracts, the sweat glands and even the endocrine glands — are subject to reflex action. So also is smooth muscle, that of the gastrointestinal tract (peristalsis), genitourinary tract (uterus or ureters), the bronchial musculature, the blood vessels and the capillaries (blushing), — the whole vasomotor system, — and the skin. I could cite many examples of conditioned reflexes involving these systems, but time limits me to some of clinical importance.

Recently, one of my confreres told me of a patient who was allergic to onions. One evening she entered the dining room for supper and saw on the rug what were apparently onion peelings; she immediately developed a conjunctivitis and a stopped-up nose. Withdrawing to another room, she told the maid that there were onion peelings on the floor and that they had made her sick. The maid apologized and said they would be removed immediately. Within five minutes, the symptoms in the eyes and nose were completely relieved. Then the maid returned and said that the peelings were the remains of a narcissus bulb that the dog had chewed. One may assume that the woman was sensitive to onion, but the reflex she experienced was from the retina to the tear glands, to the serous glands of the nose, and to the blood and lymph capillaries of the eye and the nose; it was a typical conditioned reflex. This episode is analogous to the observation of Mackenzie[1] on a patient sensitive to roses who had an attack of rhinitis when paper roses were brought into the room.

I observed in the Children's Clinic of the Massachusetts General Hospital, both on the same day, two children with asthma: a girl who had asthmatic attacks whenever she got nervous, the stress of visiting her physician having once been an aggravating factor; and a girl who had attacks whenever she threw a tantrum. An asthmatic attack is a reflex. Pollen may irritate the mucous membrane of the bronchus, causing reflex bronchoconstriction, serous-gland excretion and dilatation of vessels in the mucous membranes; such an effect is an unconditioned reflex. With the attack, there may be a struggle for breath and fear of dying; there are usually emotional upsets and other distressing sequelae. The set for conditioning is

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ideal, and one is thus not surprised that these patients became conditioned to emotional settings, the one of fear and the other of rage.

May not the so-called "nervous element" in asthma be in large part conditioning — that is, a conditioned reflex? Examples of both certain and probable conditioned reflexes in the field of allergy are numerous and, to the initiated, easy of detection. One of our patients had asthma repeatedly in her own home, — an emotional environment, — whereas in a foster home a few miles away, she never had an attack. Another girl had hives while at boarding school, but when she went home, they disappeared; they returned as soon as she boarded the train to go back to school. The cause of the original urticaria is not clear, but it was probably coincident with an emotion, possibly of homesickness, hence the conditioning. One may ask, "Assuming that you are right, and that this is a conditioned reflex of the skin capillaries, how shall we treat her?" The basic treatment should be not so much by calamine lotion, calcium or tincture of belladonna, but by avoiding the emotional reaction if it can be found. The woman sensitive to onions might respond merely from insight into the reflex; the girl with asthma accompanying fear, by obtaining reassurance; and the girl with asthma caused by rage, by intelligently thwarting the tantrums.

But one finds conditioned reflexes of the respiratory tract, when an element other than allergy is primary. The following case is duplicated in the practice of nearly every physician. The patient had an attack of influenza, early in January. Sinusitis and adenitis followed. Hemolytic streptococci were found. Fever lasted two or three weeks. Then the temperature became normal, and in February the child was sent back to school. She returned home with a "cold" that evening; then fever returned. Again, when she was better, she went to school. And again she got a "cold" and had another bout of fever. Once more, on returning to school, she was sick after only one day. The parents were distraught. Should she again return to school?

Does the child suffering from recurrent "colds" get a fresh virus infection each time she returns to school? Is she sensitive to school dust, sustaining each time a reflex irritation from such dust? Or, may she have a conditioned reflex to the school environment, where the first attack became manifest? The fever is a bit easier to explain; it was doubtless from the secondary invaders (bacteria of which the patient is a carrier), which became active as soon as the mucous membrane became reflexly engorged. The onset of each recurrence was apparently conditioned; the course was guided by the secondary bacteria. A prolonged summer vacation, with changed environment, sunshine and warm weather, resulted in good health, and the patient became unconditioned. The next year's school session was passed without any infection; perhaps prophylaxis by a cold vaccine was given credit for the cure.

Another example is an adult patient who had continual recurrent infections one winter; the first attack was a virus infection; the others were characterized by swelling of the mucous membranes of the nose and throat (sinusitis?). Each attack followed a shopping trip to Boston.

Everyone is familiar with the people who get colds whenever they sit in a draft. The draft reflexly leads to mucous-membrane congestion. The proverbial contest between the persons who want the window open and those who want it closed shows that everybody does not experience this reflex. It is hard to believe that a virus comes in the window and picks out only certain people. Have these persons a conditioned reflex to the cold air, and does it refer back to the chill of an original influenzal infection?

A physician recently told me that he developed a pain in the muscles on the right side of the neck on exposure to a draft. It was definitely outlined as the sternocleidomastoid muscle. The pain was a soreness, as if the muscle were fatigued from overuse. There had apparently been a tonic spasm of the muscle, reflexly caused by the cold air. Was this a conditioned reflex? Did the conditioning date back to a spasm (torticollis) from a mild adenitis under that muscle?

Attacks of angioneurotic edema are very likely to be manifestations of a conditioned reflex. A leading scientist told me that he developed puffiness of the eyes and fullness of the throat when facing the stress of an important lecture.

About seven years ago, I read a paper before a Maine medical society on diarrhea in infants and children. I covered the causes of death — dehydration, toxemia, acidosis and inanition — and the treatment. At the end of the talk, one of the local physicians got up and said: "You have told us nothing about nervous diarrhea. Why is it that when I get excited I have diarrhea?" In reply, I intimated that this was not common in children. However, I have thought it over a great deal since then. I now believe that nervous diarrhea is quite frequent in children.

We have all seen infants with summer diarrhea; those of us in pediatrics before 1920 have seen many. The baby gets diarrhea; it is starved; the diarrhea is checked. Then feeding is cau-

tiously resumed. Diarrhea tends to return, and nutrition is not maintained, although dehydration and toxicity are no longer present. If one observes these cases carefully, one may note movement of the bowels whenever the baby is fed, or whenever it is handled. Is this nervous diarrhea, peristalsis due to a conditioned reflex of the bowel muscles? Too often, the diarrhea returned when the patient was considered cured. Was this reinfection? Or may it have been conditioning? I recall one group of infants with summer diarrhea who persisted in having loose stools and malnutrition until January. Then all contracted measles, and were cured. Change of habits incident to the latter disease apparently unconditioned them.

If one has traveled a great deal in Europe, he will have consumed much sour cream and sour-cream ice cream. Two such travelers developed dysentery lasting three to five days. But every time ice cream was eaten over the next several years, a diarrheal movement shortly followed, with much of the pain and distress of the original dysentery but with no fever. One may therefore well ask, How many of our so-called "sensitivity-to-food episodes" may be conditioning rather than real allergic or toxic actions?

I recently had under my care a newborn baby. It was breast fed and had regained its birth weight at nine days of age. Then it developed loose stools — seven or eight a day — and stopped gaining. It had a stool every time it nursed. It appeared conditioned to have a stool every time it was fed; the nutrition was affected. To maintain nutrition, it was necessary to inhibit the reflex. Change of feeding habits or timing, bottle feedings, barium and bismuth were all considered. In this case, lime water gave relief.

In my own experience, a tendency for loose stools has on occasions been quite suddenly checked by a relatively heavy meal. A change of eating habits, type of food or time of eating seems occasionally to inhibit the hyperperistalsis. Does the banana or raw-apple feeding of diarrheal infants act to inhibit conditioned diarrhea?

Conditioning is apparent not only in diarrhea but also in habitual vomiting. One of my infant patients had been doing nicely until one day he vomited his orange juice; the next day, he also vomited his orange juice; other food had not been vomited. I recommended a change from orange juice to tomato juice, and the vomiting ceased.

The following story will be appreciated by those who have had to undergo intensive treatment with some of the new "magic" drugs. A ten-year-old patient had arthritis and tonsillitis. He was soon receiving by physician's orders eight aspirin tablets, twelve sulfanilamide tablets, six yeast pills, four of vitamin B_1, four of vitamin B_2, four of nicotinic acid, eight of ascorbic acid and enough others to total fifty pellets a day. Each time, the pills went down harder and harder. By and by, it took half a glassful of water to down each pill. Gagging and occasional vomiting occurred. Anorexia followed. The sight of a pill was the sign for gagging, and conditioned vomiting was being established; when all pills were omitted, normalcy was restored.

The training of the infant in bowel habits is an application of the conditioned reflex. The youngster is placed on a chair, or pot, and a soap stick is inserted rectally. The irritation of the soap stick sets up rectal peristalsis, and the bowels move. The next day, the same procedure is carried out. The following day, just putting the child in his chair is sufficient to lead to rectal peristalsis, and the conditioning is accomplished.

The conditioning of the older child and the adult to regular bowel movements is much the same. But this conditioning can easily be broken if the patient makes a visit, — it is usually the "change of water," if one can believe what one is told, — if he oversleeps, as on a Sunday, if he is forced to share the bathroom facilities with visitors, or if he neglects the call of Nature.

It is now realized that the epileptic has some lesion in the brain or meninges that is the basis of the convulsive seizures. The actual attack is brought on by a reflex action originating elsewhere; these precipitating causes are numerous and include fatigue (eyestrain, poor posture), foci of infection, emotional reactions and constipation.

A few years ago, Dr. Frank Fremont-Smith[2] reported to the New England Pediatric Society the case of a young lady who had epileptic attacks on two different mornings after going on "blind dates." It was learned that she previously had become very much in love with a young man, and had been upset when he gave her up; she had met him while on a blind date. She died of a brain tumor six months later. The cause of the epilepsy was the brain tumor, but the convulsive attack was precipitated by the blind date. Another epileptic girl had an attack whenever she heard a loud or unusual noise, such as that caused by a falling kettle cover, by a boy falling from his bicycle or by a door slamming. The most frequently mentioned precipitating cause of an epileptic attack, however, is constipation. Is it due to autointoxication or conditioning?

In handling epileptic patients, one should con-

sider a conditioned reflex not as the cause of the brain lesion but as a possible factor in precipitating the attack.

Dentists see numerous cases of conditioning, resulting in syncope and diarrhea. Apprehension is undoubtedly the cause of the conditioning.

* * *

With a recurrent complaint, such as upper respiratory infection, vomiting, diarrhea, allergic manifestation or convulsion, one should consider the possibility that a conditioned reflex has been established. A conditioned reflex may also be the basis of the onset of a bacterial infection. The so-called "nervous diseases" are frequently manifestations of conditioned reflexes.

One may rest assured, however, that not all conditioned reflexes are bad, any more than all habits are bad. Many conditioned reflexes are quite useful adjuncts to a normal and happy existence.

It is not particularly difficult to recognize that a patient's trouble is due to a conditioned reflex; it is often quite difficult to identify the causative stimulus, and even more difficult to remedy or inhibit the reflex.

One cannot help wondering if much of the relief from faith healing and from physiotherapeutic treatments is the result of inhibiting a conditioned reflex.

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CONDITIONED BEHAVIOR*

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BOSTON

NOTHING intrigues the clinician more than a clinical case, and since I am today addressing men whose interests are primarily clinical, I shall outline as briefly as I can — and I hope more briefly than one would expect of a child psychiatrist — a case from which may come a realization of the importance of early life conditionings in the later personality deviations of childhood. It should be remembered that psychiatrists deal with complex pattern reactions rather than with the simple conditioned responses referable to one sign or symptom, and that I cannot give all the material — many times but slowly and painfully produced by the patient — that brings the conditioning factors into relief.

Frank, a 15-year-old boy, was referred to the Judge Baker Guidance Center by a welfare agency that asked for advice about disposition of the boy because he was a serious behavior problem at a trade school. According to the case record: "He has deliberately tried to undermine the authority of the teachers, is saucy and insubordinate, refuses to obey, and makes 'fools' of the teachers for the amusement of the other boys. He tries to attract attention by clowning, and tried to make himself out a 'tough guy,' telling such realistic stories about life at the Lyman School that people thought he must have been there. He has been in three foster homes before this school placement, showing the same reaction to authority and discipline in each, and he has particularly evidenced his hatred toward men who tried in the most friendly way to supervise him." He was discharged from the trade school, the day before I saw him, for insubordination and fighting with the masters.

Physical examination showed a good-looking, well-developed youngster (above the average in height, and 13 pounds above the average in weight). He had no physical defects or disabilities, and the clinical history revealed that he had never been seriously ill. Two things were noted that were of interest later: he was very proud of his physique (flexing his muscles, expanding his chest), and he was well groomed and clean.

Psychologic examination showed the boy to be of average or better than average intelligence — he had an I.Q. of 117 on the Terman Test. He showed superior ability in work with concrete material, and hence one would have expected him to do well in trade training. He started school at 5 years, got A's and B's in the grades until his 12th year, when in the 8th grade he lost all interest in school; his marks dropped well below passing, and he was not promoted. Inasmuch as most of the difficulties for which he was referred began at that time, one could tentatively say that the precipitating (but by no means causal) factor or factors presented themselves then.

A glance at the family history gave a suggestion of this precipitating factor. Frank was the eldest of three children. His father, although intelligent, was spasmodically employed as a skilled workman; for most of his married life, he had been cruel and abusive to his wife. He had one job after another, having little difficulty in finding work even during the depression years, but repeatedly resigned his job at the least sign of authority on the part of his employers. He was thin, suffered from stomach trouble, and was nervous. The mother was described as "intensely neurotic, a poor manager." The home was poorly kept, and the children were allowed to run wild. Three years before I saw the boy, the precipitating event occurred: the home was broken up, a divorce followed, and the boy — after unsuccessful attempts to live first with the mother and then with the father — was taken over by a governmental agency. His four unsuccessful attempts at foster-home living followed.

One would expect that this boy with such a background would welcome a good home, with love, security and a chance to gain the academic and vocational training that

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his own home would never allow him to experience. He was bright and attractive. What were some of the reasons for his inability to make an adjustment? Or better — for the purposes of this discussion — what were the conditioning factors in the first 12 years of this boy's life that made him a behavior problem for these 3 years?

The psychiatrist must look beyond the precipitating factors for the evidences of the conditioned responses, and he knows them to be varied, subtle and sometimes vague and symbolic, but he also knows that they are nonetheless effective and powerful. He looks for them principally in the relationships of the boy with each parent in turn, and specifically he seeks those individual traits, characteristics or patterns that the child has taken up from each parent and made a part of his own personality, and conversely he searches for that part of the parent that he rejects and hates. Believing these mechanisms to be couched best in terms of interpersonal relationships, the psychiatrist calls them identifications with or rejections of people or of any of the multivaried attributes of these most important people — the parents. The psychologist, presumably, calls them conditioned responses and inhibitions, and would say that the parents are the unconditioned stimuli that determine a child's response to people beyond the home ever after. Therefore, Frank's attitudes — his loves, hates and fears, and his acceptance or rejection of people — even extending by what Pavlov and Krasnorgorski call "generalization" to the most trivial attributes (the behaviorists would call them "elements") of various persons' faces, hair, clothes, occupations, hobbies and so forth, — all were largely based on his attitudes toward his parents woven into his behavior patterns in his very early years. Some of these points, as given by him to the psychiatrist, are briefly presented below.

In the course of the interviews, the boy gave many descriptions of his father and his feelings of hatred toward him long before the excesses leading to the divorce were in evidence. His father, of course, was the source of discipline in the family and was usually unreasonable in his demands. Moreover, he was more lenient with the other children, and his tendency to take their part in intrasibling rows and quarrels led Frank to develop strong feelings of jealousy of the siblings because of alleged favoritism. Frank particularly emphasized his hatred of his father's personal habits: his father did not keep himself, or his clothes, clean; he was slovenly, did not shave every day, took little or no care of his teeth, and seldom bothered to wear a necktie. The father was thin and was always taking medicine for supposed stomach ailments, but withal he was frequently absent from meals, ate a poorly balanced diet, and drank and smoked cigarettes to excess. In brief, then, these are some of the characteristics of the adult man (the stimulus) that prompted responses of obedience from Frank for 12 very important years; many of these promptings were — as is so frequent in the arduous task of growing up — accompanied by (and hence associated with) various amounts of pain and resentment.

One is interested in the responses given by Frank to men other than the father who later asked that rules be followed and that chores be completed — or even to those adults whose interest in Frank was to help him without asking that he himself do anything in return. I must add, too, that during the time this material was forthcoming he did not consciously associate his likes and dislikes with his father's personal habits or traits.

In the first place, the boy took a dislike to me, his physician, because I smoked and because I wore blue shirts (his father wore blue shirts). (I shall add, however, that I was not without a necktie, and that I was shaven and, I hope, passably clean.) He was quite careful to emphasize what he was not going to do, hoping to avoid any demands that I might wish to make of him.

In his first foster home, he stayed 2 weeks and then ran away. He described the home as dirty, and he stated that the foster father and foster mother "didn't bother to keep themselves clean, let alone the kids." (This accusation was not true.) He refused to do even the simplest and easiest tasks about the house, was arrogant toward the younger children, and bragged of his physical prowess and criminal exploits when he was trying to impress the older ones.

In the next foster home, everything went quite well for some months until the foster family took two other boys to board. Frank immediately accused the foster father of favoring the other two, and of making him do more than his share of the chores. He fought with these boys, would not allow them in his room, and refused to let them read the books that the foster father had previously bought for him. He finally became so surly and aggressive toward this foster father, whom he had previously liked, that he had to be removed.

In his school placement, he again did well for a short period, but soon his old patterns became evident, although at no time, as he later admitted to me, did any of the masters or fellow students initiate the quarrels. He was at a loss for an explanation of the fundamental cause of his antagonisms, but he readily gave what were to him their most outstanding characteristics. He scorned the younger pupils as babies who did not even keep themselves clean. He would not ride in the bus with them. (His siblings were both younger than he.) He fought with one boy continuously because he was "thin and anemic" (Frank always pictured himself as strong and powerful), and because he was "too well liked by the headmaster." One teacher he disliked because he knew he smoked and he suspected him of drinking alcohol. Another master, the athletic instructor, whom one would expect Frank to look up to and emulate, was an anathema because he was redheaded and had a mustache. (His father has reddish hair and a small mustache.) The shop instructor was sloppy in his habits, did not clean his fingernails, and wore blue denim shirts, open at the neck.

In a temporary home placement, the boy carried over his hatred of the school's athletic instructor to his new foster parent, who happened to be a coach in a nearby college. He admitted that he liked this man at first, but after a reprimand for not helping in the household tasks he took a strong dislike to him and consciously equated the two men in personality and attitudes.

One could add many more instances wherein this boy's reactions to people, and particularly to those in authority, were conditioned (sometimes by association to the minutest details of physique and habit) by his responses to and feelings about the first and most impressive authority-stimulus in

his life, his father. I have, of course, not commented on his feelings about his mother or the patterns predicated thereon, but they are quite as interesting and instructive.

Treatment of this boy entails a long-time process of reconditioning. He must, with assistance, gain insight into the varied and subtle ways by which this initial pattern reaction to his parents and siblings is reactivated with such disastrous results in later and other situations entailing adults and children who are not his parents and not his favored siblings — even though they may have a few elements or attributes in common. In the terms of Pavlov, he must learn to differentiate the people who stand before him as stimuli.

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POST-PARTUM CARE*

Preliminary Report of Studies in a Follow-Up Clinic

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POSTNATAL care is not new in the true sense of the word, and yet in years past, the application of this care has been indifferent and, in general, without sufficiently close supervision to be of any value, either to the patient or to the physician.

One of us (C. W. S.), after close supervision of his own private cases for a period of years, has been impressed by the fact that it would be just as practicable to administer this same care to house cases. Prenatal care is now highly developed and specialized. Why should not postnatal care, which is just as important although not so well recognized, be carried out in the same painstaking manner? It is our opinion that insufficient time is devoted to that part of the post-partum period when most of the serious, persistent and chronic conditions of the postparturient woman present themselves.

In most postnatal clinics, patients are discharged six weeks after delivery, unless unusual complications are present. This, we believe, is a serious error because, as previously mentioned, many of the conditions that adversely affect the patient's future life occur after this period. Moreover, a follow-up of this period furnishes excellent clinical material for the instruction of medical students, interns, residents and junior staff members. Greenhill[1] advocates the follow-up of the postnatal patient for one year and predicts that, if as much care is given after delivery as prenatally, untold misery will be avoided — such as cancer of the genital organs, a high incidence of which is found even in well-run clinics.

Accordingly, we decided on a program of examining patients routinely six, twelve, twenty-four and forty-eight weeks post partum, and at as many other times as each case seemed to require. This procedure has been carried out for only a year, and this is therefore merely a preliminary report.

One of the problems was to impress on the patients the value of our follow-up of one year. Enlisting the aid of the Social Service Department, we decided on preparing three form letters: the first letter, which was given to the patient while she was in the hospital, explained our plans and made the first appointment (six weeks after delivery); the second letter, which was sent if the patient did not keep her appointment, gave another date; the third letter, which was sent if the other two were disregarded, asked the patient to come to the clinic on the next clinic day. If she then failed to appear, she was removed from our active file. We also enlisted the aid of the Community Nursing Association, which first undertook the follow-up work on a basis of trial; however, the results were so successful that the association has undertaken the problem as a regular function for the coming year.

It has been our practice to have the house staff of the previous three months take over the postnatal service for the following three months, supervise the work of the residents and interns, make suggestions and confirm diagnoses. In addition, the third-year and fourth-year medical students at Boston University School of Medicine attend in the capacity of observers. The advantage of this system is that the same men who treat the patients have the opportunity to follow them in the postnatal period.

The house and district obstetric services of the Massachusetts Memorial Hospitals comprise yearly 700 to 800 patients, of whom about 500 to 600 are delivered in the hospital and 150 to 200 on the district. On discharge, both house and district cases have a routine obstetric summary and physical examination according to a special

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form, which is forwarded to the postnatal clinic and filed with the record. All patients are instructed in routine exercises and also in the daily practice of vinegar douches in an attempt to restore the normal pH of the vagina; furthermore, they are advised to continue taking iron until the first postnatal visit.

Of the 631 house deliveries for 1940, 482, or 76.5 per cent, returned for a total of 1617 visits. These clinics at first averaged about 24 patients a week for a given month, but gradually grew to average as high as 41. For the year, the average was 35 patients, the largest number reporting in June and July, possibly owing to summer vacations. Table 1 shows the growth and monthly variation of the clinic.

TABLE 1. *Census of Postnatal Clinic.*

Month	No. of Admissions	No. of Re-Admissions	No. of New Patients	Average No. of Patients Per Week
January	98	72	26	24
February	118	96	22	24
March	151	109	42	38
April	125	95	30	31
May	120	69	51	30
June	163	95	68	41
July	117	80	37	39
August	176	116	60	35
September	128	91	37	32
October	190	146	44	38
November	100	68	32	33
December	131	98	33	33
Totals	1617	1135	482	33

Subinvolution

Subinvolution was found in 15 cases. The diagnosis was established on the finding of a large boggy uterus, subjective symptoms and bleeding. A uterus that is not contracted below the symphysis at six weeks was considered to be subinvoluted, the fact that multiparity influences the uterus being considered. Twelve cases had no associated symptoms. Three cases had associated bleeding, which was not severe. Hot prolonged douches completed the involution in all these cases. The patients were mostly multiparas with large families who obviously were neglectful in obtaining rest and proper hygiene.

Procidentia

Procidentia was found in only 3 cases; of these, 1 was first degree, and 2 were second degree. Since all these patients were in the childbearing period without symptoms, no treatment was considered necessary. It is our opinion that treatment of this condition should be influenced by the severity of the symptoms and the discomfort experienced. Atlee[2] advocates treatment before late years and before more serious trouble sets in if the patient has symptoms. If, after repair, subsequent labors are well managed and enough time is allowed to elapse after operation, there should be no ill effects.

Retrodisplacement

Retrodisplacement of the uterus was found in 307 cases, or 60 per cent, and of these patients only 28, or 8 per cent, showed symptoms. Manual replacement, with insertion of a pessary, was tried in all cases with symptoms. Those patients in whom the pessary cured the symptoms, but who did not remain symptom free with removal of the pessary, were referred to the Surgical Service for operation. If the uterus returned to its posterior position without symptoms, once the pessary was removed, we did nothing. We do not believe that a uterus should be replaced anteriorly if the patient is symptomless. DeLee and Greenhill[3] state that exercise for uterine replacement, except in the immediate post-partum period, is worthless. This has also been our experience in the clinic.

Lacerations

Cervical lacerations were observed in 174 cases, or 36 per cent: these were divided into 80 unilateral, or 46 per cent, and 94 bilateral, or 54 per cent. Most cases found were in multiparas, and the degree of involvement was proportional to the number of pregnancies.

Erosions

The commonest complication found in the clinic was erosion, with or without endocervicitis. The erosions were classified as slight, moderate or marked, depending on whether a small or large part of the portio or canal was involved. Slight erosions were found in 225 cases, or 44 per cent, moderate erosions in 56 cases, or 12 per cent, and severe erosions in 34 cases, or 7 per cent, for a total of 315 cases, or approximately 63 per cent of all cases examined.

Matthews[4] states that the etiology of these erosions is trauma, with associated infection, and that the commonest organisms are the streptococcus, staphylococcus, gonococcus and colon bacillus. The gonococcus and staphylococcus are the most frequent offenders. Matthews tells how the columnar epithelium, because of the constant stimulation of infection, pushes out into the vaginal portion of the external os, replacing the stratified squamous epithelium common to this area. Hypersecretion of the glandular structures, if these are obstructed, goes on to the formation of nabothian cysts. Therefore, an erosion is not an ulceration but a new formation of glandular tissue. Wollner[5] states that these changes can be produced by unopposed action of estrin. He be-

lieves that endocrine imbalance is responsible for the production of these erosions. Roblee[6] attempts to show that vaginal pH is the cause of these erosions, and that a cervix with a pH of 6.5 to 7.5 shows columnar proliferation. A report of the Central Association of Obstetricians and Gynecologists[6] reveals that birth trauma is the most significant factor in erosion and endocervicitis. Barrett[7] states that cervical injury occurs in the majority of vaginal deliveries, and that, if they do not heal, these lesions favor the future development of chronic endocervicitis and hypertrophy and may be the source of serious pelvic disease. Fulkerson[8] considers the trauma of abortion or labor to be the cause, and believes that the infective organism is seldom the gonococcus.

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In the literature, erosion and endocervicitis have been found to be the cause of leukorrhea, backache, occasional menstrual disturbances, urinary symptoms, sterility and a bearing down or dragging sensation in the pelvis. The value of treating these lesions early is emphasized by Matthews,[4] who states that "the new gland tissue may become malignant under certain conditions." He also shows that there is slight difference between the orderly arrangement seen in cystic hyperplasia and endocervicitis and the disorderly arrangement, with embryonal cells, found in true neoplasm. Moench[9] declares that the infected cervix may become a focus in chronic arthritis.

The popular methods of treating these erosions and endocervicitis appear to be by caustics, electrocoagulation, cautery, conization and the Sturmdorf operation. The controversial attitude of older writers is changing gradually, and more recent work tends to support electrocoagulation and conization. Fulkerson[8] states that caustics and antiseptics are only palliatives and rarely curative, and recommends the use of the cautery. Frost[10] advocates electrocoagulation not only of the postpartum cervix but also of the prenatal cervix from the sixth week to the fifth month. Much could be said for and against this statement about the prenatal cervix, but we are in agreement with the statement regarding the postnatal cervix. Miller and Todd[11] advocate conization for the more extensive benign lesions of the cervix and say the conization will completely replace the Sturmdorf operation. Greenhill[1] states that conization will accomplish as much as the Sturmdorf operation without the expense or inconvenience of the latter operation. Stadiem[12] condemns cauterization of the cervix because this procedure does not allow microscopic study of the whole or part of the cervical tissue. Zelezny-Baumrucker and Baumrucker[13] are in favor of electrocoagulation to promote healing and stop leukorrhea. Jacoby[14] states that cauterization with electricity is the method of choice because cervices heal faster with this than with other methods. Electrosurgery is contraindicated in women in the childbearing age and pregnancy, and in those with acute cervical involvement, and acute and subacute tubal involvement.

In our clinic, we have investigated 100 cases of erosion and mild endocervicitis, which we have coagulated, and 25 cases of marked erosion and endocervicitis with cyst formation, which we have coned.

We believe that some cases of erosion may be due to endocrine influence, but that this complication generally appears late in pregnancy and is completely healed about six weeks post partum. These erosions are often found in the prenatal clinic, and become so severe that the possibility of placenta previa has to be ruled out because of vaginal bleeding. They typically show the heaped-up advance of rapidly proliferating columnar epithelium invading the portio. This picture is consistent with Wollner's[5] theory of "estrogenic stimulation," causing erosion. On discharge two weeks post partum, some cervices show little evidence of former endocervical hyperplasia, which is consistent with the return of the estrogenic level to normal post-partum levels.

The influence of the pH of the vagina in causing and healing these erosions is uncertain. The statement of Roblee[6] that the factor of the lowered pH is the causative agent in erosion cannot be denied or confirmed by our observations. However, that a lowered pH is an essential requisite in the healing of this type of lesion cannot be denied. The spontaneous healing of many mild erosions that exist beyond the immediate post-partum period can be explained on these grounds. For this reason, we routinely prescribe acid douches after delivery as an aid in preserving an acid medium.

In agreement with most authors, we believe that the trauma of labor and infection play the leading roles in the causation of these conditions. Of 100 cases selected from our service, we found that the average parity was three and the average time that elapsed before treatment was nine weeks post partum. We believe that the majority of these mild erosions and hyperplastic lesions that are seen in the first six weeks post partum heal spontaneously. For that reason, at the first postnatal visit, we are conservative in our estimation of cervical disease. If an erosion is present, these patients are asked to return weekly for observation. If healing is not prompt, more vigorous therapy

is instituted. In these early cases, caustics, such as silver nitrate, probably have little value. The earliest case that we coagulated was eight weeks in duration, and the oldest was one year. Of these 100 cases, we classified 17 as slight, 50 as moderate, and 23 as marked. Discharge was the chief complaint in 46 per cent, and bleeding, traumatic or otherwise, was encountered in only 5 per cent. No case was coagulated if there was any evidence on bimanual vaginal examination of tenderness suggesting infiltration or other signs of pelvic infection. Twenty of these cases had previously been treated with silver nitrate, some as long as six months. This only helped to convince us of the worthlessness of this method. The average surface-healing time for this series was five weeks. This is much shorter than that reported by Jacoby,[14] unless he refers to complete capillary obliteration. In this series, we had failures in only 2 cases; one, we believe, should have been coned, and the second was not coagulated deep enough but, when recoagulated, healed in six weeks. Four per cent of our patients treated by coagulation became pregnant before they were discharged from the clinic.

There were no cases of activated pelvic inflammation, probably because, as previously mentioned, no case that showed the slightest evidence of pelvic inflammation was coagulated. We have followed 50 cases for three and 17 for six months, with no recurrence.

In the 25 cases of marked erosion and endocervicitis, the therapeutic method of choice was electroconization. The indications for conization, differing from coagulation, were as follows: profuse discharge, uterosacral tenderness, backache attributed to uterosacral infiltration, edema, hyperplasia of the cervix and severe cervical laceration.

Patients were instructed to report for appointment the day that they started menstruating, and to come in to the hospital usually two or three days postmenstrually without breakfast. Pentothal intravenously or nitrous oxide and oxygen was the anesthetic of choice. After coning, the bleeders are coagulated and, if necessary, are sutured. Sutures are also used to reconstruct the cervical canal if extensive plastic measures with the coning knife are necessary. After operation, the cervical canal is packed with iodoform gauze, and the vagina with vaseline gauze. Both packs are left in situ for three days. After removal of both packs, douches are begun daily. If the pH is kept low, there will be less bleeding, and any sutures used will hold better.

The average parity in these cases was four; the time post partum was eighteen weeks. Backache was found in only 4 cases, about 16 per cent, and we noted that in general the symptom is oftener one of orthopedic than of gynecologic origin. Half the cases showed nabothian-cyst formation — evidence of long-standing infection. One case showed an epithelioma (Grade III), which the pathologist thought was completely removed. The patient was treated with radium and x-ray promptly, and is still under observation. Two cases exhibited polyps that on microscopic examination proved to be benign. The average time required for surface healing was six weeks.

We followed 14 of these 25 cases for three months and 7 for six months. There were no poor results or recurrences, and the patients were free of symptoms on subsequent examination. We encountered bleeding in only 1 case postoperatively; that was two weeks after coning, and the bleeding was probably traumatic in origin.

We have not as yet followed any of these cases through pregnancy, but one of us (C. W. S.) has followed private cases through two or three pregnancies, with no evidence of dystocia or tendency to abortion. There frequently appears to be a narrowing of the cervical lumen at six to eight weeks. This is a simple exuberant proliferation of epithelial cells. At ten to twelve weeks, the same canal is widely patent, owing to recession of the tissues and the disappearance of edema. To date, we have had no cases of stenosis or abortion.

We believe that conization is the therapy of choice in this type of case, but that it should be performed in the hospital under anesthesia, because of the danger of severe bleeding. Furthermore, this procedure allows a thorough examination to be done on the cervix and ample time to destroy all nabothian cysts. The use of excessive current destroys tissue for the pathologist and causes excessive slough, which may be followed by bleeding. Conization is an excellent method of cervical biopsy, by which many cases of unsuspected cancer may be discovered, and it does not cause dystocia or stenosis.

Anemia

Only 2 cases of anemia were encountered post partum; they were both of a dietary nature and responded to diet and iron therapy. This condition may be eliminated if the patient is instructed in taking some type of iron preparation during the first six weeks following delivery and if a proper diet can be followed.

Perineal Relaxation

In the hospital, the use of perineotomy is routine in all primiparas and also in multiparas when

indicated. The benefit of this practice can best be seen in that only 4 cases showed poor perineal support.

Only 2 cases of secondary repair, both in the recent post-partum period, were performed in the hospital. One was especially interesting in that a vitamin C determination showed the patient to have subclinical scurvy. After treatment with vitamin C, the patient was repaired and promptly healed. The other was a case of infection, which broke down.

Cystocele and Rectocele

Slight degrees of cystocele and rectocele were found in many cases. However, only 30 severe cases of cystocele, or 6 per cent, and 21 marked cases of rectocele, or 4 per cent, were discovered. This is a very small number, when one considers that many of these were found in women who had had many pregnancies and who had been delivered at home.

Cystocele and rectocele in slight degree appear to be the end result of almost all deliveries by the vaginal route. We believe that prophylactic forceps delivery and perineotomy as routine procedures greatly reduce the severity of these complications. We also think that great damage may be done to the pelvic tissues, even where there is no external laceration.

Infections

No proved cases of gonorrhea or trichomonal infection were observed, but there were occasional cases of infection by monilia. In consideration of the number of examinations done, this is rather remarkable. Greenhill[1] states that no pathogenic organism except monilia can exist in a medium below a pH of 5.

Nonobstetric Diseases

A very short time had elapsed before we realized that we should find many conditions in these women that would be beyond the scope of our clinic. This required the reference of 137 cases, or 27 per cent, to other clinics for treatment. Appreciating that cases involving the kidneys should be more closely followed than the average patient, we established a close link-up with the genitourinary service, and cases were jointly followed in detail. We hope in the future that this study will be a source of information and research, and that lessons of value will be deducted. At the present time, the follow-up of this type of case in the remote post-partum period seems to be neglected. Table 2 shows the distribution of cases referred to other clinics. Two cases referred to the surgical and genitourinary services are of special interest.

The patient in one case complained of pain in the left lower quadrant for which no apparent cause was found; this was when she was about five months pregnant. The pain became severer when the patient walked or arose from a sitting position, and did not radiate. During the post-partum period, a mass was found in the left upper abdomen. The pain, although not constant, became severer at times. There were no genitourinary or gastrointestinal symptoms or loss of weight. At operation, a large ovoid-shaped, moderately movable mass was found; it was 15.2 cm. in length and 8.9 cm. in width, extending from the upper border of the left broad ligament to within 2.5 cm. of the lower pole of the left kidney. The peritoneum over the tumor was thickened and edematous, with the appearance of an inflammatory mass. The mass was found to contain old chocolate-colored blood. The diagnosis of a retroperitoneal hematoma was made. The etiology of the hematoma could not be proved, and there was no history of trauma.

TABLE 2. *Cases Referred to Other Clinics.*

CLINIC	NO. OF CASES
Medical	39
Orthopedic	25
Surgical (House)	13
Prenatal	11
Genitourinary	10
Surgical (Out-Patient Department)	8
Eye	8
Thyroid	5
Gynecological	4
Endocrine	4
Cardiac	3
Nose and Throat	3
Skin	3
Vascular	2
Rectal	2
Diagnostic	2
Asthma	1

The patient in the other case complained of pain in the left hip and left lower quadrant for a year; it had become worse during pregnancy. After delivery, the patient was followed in the post-partum clinic, where a pelvic mass was found. The diagnosis of ectopic kidney was made. The kidney was removed, and the patient made an uneventful recovery.

SUMMARY AND CONCLUSIONS

Nearly 500 obstetric cases were followed for as long as one year post partum. The results indicate that prolonged and intelligent post-partum care is extremely valuable in preventing, discovering and properly treating the sequelae of delivery.

The commonest complication after delivery was erosion, with or without endocervicitis. The causes of the erosions may be divided into endocrine, chemical and traumatic associated with infection. Coagulation and conization are the methods of choice in treating these lesions. The latter is a hospital procedure, and should be performed under

anesthesia. Coagulation and conization should never be done if there is any evidence of pelvic infection.

Rest and proper hygiene are essential for proper involution of the uterus. Retrodisplacement of the uterus, without symptoms, is normal in many cases. If symptoms are found early in the postpartum period, manual replacement and the insertion of a pessary comprise the method of choice for treatment. Surgery may be resorted to if the condition is unrelieved by these methods.

If there are symptoms, procidentia calls for surgery.

Prophylactic forceps delivery and perineotomy, if necessary, prevent much damage to the pelvic tissues.

Cases involving the kidney should have more intensive and specialized follow-up.

Backache is oftener orthopedic than gynecologic.

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MEDICAL PROGRESS

CARDIOLOGY: I. CHEMOTHERAPY IN HEART DISEASE. II. THE FALSE DIAGNOSIS OF ORGANIC HEART DISEASE*

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I. Chemotherapy in Heart Disease

THE striking therapeutic successes achieved by the sulfonamide compounds in a variety of diseases have led naturally to the trial of these substances in the treatment of various diseases of the cardiovascular system. Sufficient time has elapsed to make it profitable to review and evaluate the results obtained to date in the chemotherapy of heart disease.

Rheumatic Fever

Hopes that the sulfonamide compounds would exert a favorable effect on active rheumatic fever have not materialized.[1, 2] As pointed out in a previous communication,[3] convincing studies have demonstrated no beneficial effects on chorea or on active rheumatic infection in any of its stages. On the contrary, the incidence of toxic reactions to these drugs is apparently increased, and the clinical course of the illness seems to be adversely affected. When patients with rheumatic heart disease suffer from acute streptococcal tonsillitis, conservative clinical judgment must be exercised about the advisability of administering a sulfonamide compound, particularly since it is the impression of some observers that latent rheumatic infection may be activated by such chemotherapy.[1]

Several studies[4-6] have been made to determine whether sulfanilamide administered prophylactically to patients in the latent phase prevents recrudescences of acute rheumatic fever. It is recognized that recurrences and exacerbations are often associated with upper respiratory infections. It therefore seems reasonable that the prevention of hemolytic streptococcus infections may prevent these rheumatic recrudescences. Thomas and her associates[6] have recently reported the results of a four-year study. Sulfanilamide was given continuously from October or November until June to 55 patients with recent histories of acute rheumatic fever during 79 person-seasons between 1936 and 1940. Sixty-seven patients with a similar history who were given no prophylactic treat-

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ment were observed simultaneously during 150 person-seasons. Major rheumatic recrudescences did not occur in those receiving sulfanilamide prophylaxis, but major attacks of acute rheumatic fever in 15 patients and the development of subacute bacterial endocarditis in 2, resulting in 4 deaths, occurred in the control group. Twenty grains of sulfanilamide was administered daily, divided into two doses taken twelve hours apart. The toxic effects from this prolonged dosage with sulfanilamide were negligible. Encouraging results from similar prophylactic treatment have recently been reported by Coburn and Moore.[5, 7] Infections of the throat were prevented, and rheumatic recrudescences did not occur. These authors, who used somewhat larger daily doses of sulfanilamide, namely 30 to 45 gr., noted toxic symptoms in approximately 10 per cent of the treated subjects. The incidence of rheumatic fever in their group of 184 children over a three-year period was less than 1 per cent, whereas the expectancy according to the control group was 35 per cent. After the onset of streptococcal pharyngeal infections, administration of the drug did not prevent rheumatic recrudescences.

These encouraging results offer hope that further studies in larger groups by various investigators will provide the basis for an additional method with which to combat rheumatic fever.

Subacute Bacterial Endocarditis

Until recently, all treatment of subacute bacterial endocarditis has been considered generally ineffective. The use of the various sulfonamide compounds — either alone or combined with hyperthermia, heparin, radiation or intravenous typhoid-paratyphoid vaccine — has naturally aroused widespread interest. In an evaluation of the results of therapy of this condition, three essential criteria must be satisfied: the diagnosis of endocarditis must be established with reasonable certainty; the incidence of spontaneous recovery must be used as a comparative basis; and variations of the virulence of certain infections from year to year must be considered. That spontaneous remissions of the disease and even recovery may occur is evidenced by the reports of various authorities. The most favorable outlook for spontaneous recovery from subacute bacterial endocarditis is contained in publications by Libman.[8, 9] He differentiated the so-called "bacteria-free" and "recovery" cases, employing the former term to designate those cases in which the bacteria had disappeared but sequelae were present, and the latter to indicate the disappearance of the infection without any residual clinical evidence except the valvular defect that might be present. He noted full recovery in about 3 per cent of the patients in the usual form of the disease running a course of four to eighteen months or more. In a later report,[9] Libman enumerated 12 recoveries in a total of 1000 cases. Three per cent probably represents, therefore, the most optimistic incidence of spontaneous recovery. In 200 cases collected from the literature and from the records of the Mt. Sinai Hospital in which the sulfonamide drugs were administered, recovery occurred in 6 per cent.[10] In much smaller groups of cases in which chemotherapy was combined with heparin, hyperthermia or other measures, the recovery rate was somewhat higher. The number of cases was too small, however, to yield conclusive results. In general, it appears that all the combined methods of therapy have as their effective agent the sulfonamide compounds. Indeed, untoward complications such as embolism and cerebral hemorrhage seem somewhat more prevalent in cases treated by the combined methods.[11–13] Present information permits no definite statement regarding the sulfonamide drug of choice. Sulfathiazole, if it is well tolerated, is effective with unusual organisms as well as with *Streptococcus viridans* and nonhemolytic streptococci and is evidently somewhat preferable to sulfanilamide and sulfapyridine. Information regarding the usefulness of sulfadiazine, which has been recently introduced, is meager, but the report by Finland and his associates[14] is not encouraging. They obtained negative blood cultures after treatment in only 1 of 5 cases; in the others, the bacteremia persisted in spite of continued therapy. At the time of their report, 1 patient was still under treatment, the other 4 having died.

The generally disappointing results of chemotherapy in subacute bacterial endocarditis, despite the not infrequent negative blood cultures obtained following administration of the drug, are made understandable by the work of several groups of investigators,[15–17] who have studied the bactericidal effect of the sulfonamides on various strains of streptococci under various conditions of growth in vivo and in vitro. Human blood clots suspended in solutions of sulfanilamide, sulfapyridine, sulfathiazole and sulfamethylthiazole for periods of one to fifteen days do not show any appreciable penetration by the drug. Even in those cases in which the drug is actively bactericidal for the causative organism, the layer of fibrin acts as an impenetrable barrier. As Duncan and Faulkner[17] have pointed out, this does not necessarily signify that complete eradication of the infection is theoretically impossible. In the

course of time, all the pre-existing thrombi could be organized into fibrous scar tissue, and all newly formed thrombi in a patient under active treatment would be impregnated with the drug. The conditions will tend to become less and less favorable for the growth of the organism, if an effective drug is taken continuously for a long time. Subacute bacterial endocarditis, however, is unlike the ordinary infection caused by a hemolytic streptococcus. It is primarily a focus of growing, relatively avirulent streptococci in a fibrinous platelet mass, which not only completely isolates the organisms contained within it from the living tissue of the body, but may also act to prevent them from coming in contact with any particular chemical substance introduced into the blood stream. The small number of reported recoveries is therefore not surprising.

To summarize, the incidence of recovery following the use of sulfonamide therapy warrants its application in cases of subacute bacterial endocarditis, and the earlier the treatment is instituted, the better presumably are the chances for cure.[18] The evidence for increased therapeutic value in combining sulfonamide therapy with other agents is not sufficiently impressive to indicate the use of the latter, particularly since untoward complications may be thereby introduced and may involve additional expense and hardship to the patient. In a large proportion of the cases treated with sulfonamide compounds, blood cultures become negative, and clinical improvement, reflected by lowering of the temperature and heart rate and increased sense of well-being on the part of the patient, may occur only to be followed by relapse. The antipyretic action of some of the sulfonamides must be borne in mind.[19] If one of the sulfonamides is poorly tolerated or is ineffective, one of the other preparations should be utilized. In some patients who recover, not only do the usual clinical signs of activity disappear, but the sedimentation rate returns to normal.[16]

Prophylactic Use of the Sulfonamide Drugs in Relation to Endocarditis

Many readers will have noted in their own experience — and this impression is further strengthened by case reports in the literature — the association of recent tooth extraction, tonsillectomy or upper respiratory infection with the onset of endocarditis. It is consequently of great interest to note the finding of Fischer and Gottdenker[20] of positive blood cultures within two hours after uncomplicated tonsillectomy in 21 of 64 cases. Blood cultures obtained preoperatively and from twelve to twenty-four hours after operation were uniformly negative. Of 18 cases in which nasal operations were performed, 2 showed transient bacteremia.

Palmer and Kempf[21] report the presence, usually in pure culture, of *Streptococcus viridans* in more than 90 per cent of extracted teeth from which cultures were taken. They also obtained blood cultures on 82 patients who had dental extractions under local anesthesia; in no case were more than two teeth removed. Negative cultures of the blood were obtained in all immediately before operation, whereas 14 of the 82, or 17 per cent, showed positive blood cultures immediately after the extractions. In 13 of the 14 patients with positive cultures, the blood was sterile ten minutes later. Transient *Streptococcus viridans* bacteremia has been observed after dental extractions by other investigators[22] in approximately the same percentage of cases.

These observations suggest that, in patients with pre-existing rheumatic valvular lesions or congenital defects in the heart, localization of the organisms on the lesions during transient bacteremia may initiate the bacterial endocarditis. The frequency with which sulfapyridine or sulfadiazine produces negative blood cultures in patients with subacute bacterial endocarditis raises the question whether a sulfonamide drug should not be administered before operative procedures in patients who are particularly susceptible to endocarditis, that is, persons with congenital heart disease or healed rheumatic valvular disease with normal rhythm and no signs of congestive failure.

Acute Endocarditis

Although recovery from simple gonorrheal bacteremia is not uncommon (indeed a transient bacteremia probably occurs in every case of gonococcal arthritis), spontaneous recovery from proved gonococcal endocarditis is extremely rare. Only 3 examples of proved cases with recovery were cited in 1939 by Futcher and Scott.[23] Newman,[24] in 1933, and Davis,[25] in 1940, also reviewed the subject. Since sulfanilamide and the related chemotherapeutic compounds have been shown to be effective in the treatment of gonorrhea, these drugs have been administered to patients with gonococcal endocarditis. The recent reports of such cases, with recovery after treatment with sulfonamide compounds,[23, 26] although not conclusive, warrant further trials of the therapeutic efficacy of these drugs. Acute endocarditis due to staphylococci, meningococci or pneumococci almost invariably results in death, even though bacteremic cases without endocarditis may respond favora-

bly.[14, 27, 28] The earlier the treatment with sulfonamide compounds is begun in these conditions, the more favorable are the chances for recovery.

II. The False Diagnosis of Organic Heart Disease

Cases are not uncommon in which the false diagnosis of heart disease has led to serious if not tragic consequences. Such errors are due to the fact that it is usually easier to be certain of organic heart disease on the basis of definite pathologic findings than it is to be certain that no disease is present when the findings are equivocal.[29] Parkinson[30] has called attention to the danger of making a definite diagnosis of heart disease on the basis of such findings, stating, "A shaky sign is a poor foundation for a weighty diagnosis." The induction of thousands into the armed forces has naturally led to increased interest regarding the significance of various symptoms and signs.[31-33] Hence, it seems appropriate to review the significance of the equivocal signs and symptoms of cardiac disease in otherwise normal persons; the effect of pathologic conditions on the heart, such as endocrine disorders and nutritional states, will not be discussed.

Sinus Arrhythmia

The decided phasic slowing of the heart beat with respiration, that is, sinus arrhythmia, may be noted by anxious patients or their relatives. It is usually asymptomatic, occurs particularly at the extremes of life in the young and the aged, and is of no pathologic significance.

Bradycardia

Cardiac rates as low as fifty are found not uncommonly in young athletes; but, in contradistinction to the bradycardia of heart block, the cardiac rate rises in a normal manner on effort. Such observation of the cardiac rate on exercise will usually establish the diagnosis. Similar slowing of the heart may be observed after acute fevers.

Premature Contractions

Premature auricular or ventricular contractions not infrequently lead the apprehensive patient to seek medical advice; the more stolid may be completely unaware of their presence. In the absence of other evidence, these irregularities should not be considered to indicate heart disease, for they may be found in hearts otherwise completely normal. In aging persons previously free of such abnormality, regularly recurring extrasystoles may, however, be an early indication of coronary arteriosclerosis. The etiologic role of coffee, tobacco and alcohol in these disturbances should always be considered.

Paroxysmal Auricular Tachycardia

Paroxysmal auricular tachycardia, with its abrupt onset and offset, and its absolutely fixed regularity at rates of 150 to 200 or even 240, generally produces severe palpitation, substernal discomfort and great anxiety. It is the commonest and least serious type of paroxysmal heart action and is often present in otherwise normal hearts. In other subjects, paroxysmal auricular tachycardia appearing in the later years may be the first indication of disease of the coronary arteries. Campbell and Elliott,[34] in a recent study of 100 unselected cases, report 3 patients who have lived fifty years after the onset of their paroxysms, another 18 for more than twenty years, and another 26, making 47 per cent, for more than ten years. Although approximately half the attacks are abruptly terminated by pressure over the carotid sinus, in others the paroxysm may persist and lead after many hours or days, if untreated, to congestive failure or cardiac pain. The treatment of this condition has been outlined in a previous report.[35]

Paroxysmal Auricular Fibrillation

Paroxysmal auricular fibrillation may occur in an otherwise normal heart as a manifestation of thyrotoxicosis, as well as in some persons without any disease. In the absence of demonstrable heart disease, particularly in older subjects, the possibility of a pathologic basis for the disorder must be considered. The report of observations by Willius and Dry[36] on 70 patients with auricular fibrillation but without demonstrable heart disease by clinical, radiographic or electrocardiographic studies indicates benignity of auricular fibrillation under such circumstances, and is in accord with the earlier observations of Orgain, Wolff and White.[37] The latter concluded that paroxysms of auricular fibrillation or of auricular flutter are in some persons merely exaggerated functional disorders of the heart, no more indicative of cardiac disease or of a poor prognosis than premature beats or paroxysmal auricular tachycardia.

Paroxysmal Bundle-Branch Block

Electrocardiographic evidence of bundle-branch block generally signifies organic heart disease and, when present in high degree, must be regarded as indicative of serious heart disease. It is therefore essential to recall that bundle-branch block may occasionally be found as part of the Wolff–Parkinson–White syndrome in young or even older healthy persons. This syndrome is characterized by three important features: a short PR interval of

less than 0.12 second, ventricular complexes of bundle-branch-block type and paroxysmal tachycardia. These patients may at times show normal electrocardiograms, at other times abnormal electrocardiograms or even alternating normal and abnormal complexes without any change in rate. An excellent description of this condition, with the addition of 19 new cases, has recently been given by Hunter, Papp and Parkinson.[38]

This form of paroxysmal tachycardia, although usually benign and unassociated with heart disease, occasionally may be precipitated by cardiac disease in some patients, but even in these the prognosis rests solely on the nature and degree of the underlying cardiac disease and is not influenced by the occurrence of this condition.

Paroxysmal Ventricular Tachycardia

Paroxysmal ventricular tachycardia is generally, and quite correctly, regarded as an ominous condition largely because it occurs as a complication of acute myocardial infarction. Rarely, it may occur without preceding or subsequent damage,[39] and a group of cases has been reported by Wilson and his associates[40] in which attacks were repeatedly induced by exertion or excitement in young and also in older subjects who showed no evidence of structural heart disease.

Disturbances in Heart Sounds

Marked accentuation or an unusually sharp quality of the first sound raises the suspicion of mitral stenosis or cardiac hypertrophy, but is also characteristic of the hyperactive but otherwise normal heart of thyrotoxicosis, effort syndrome and anxiety states. A split first sound at the cardiac apex is consistent with a normal heart, although in older persons the possibility of bundle-branch block must be considered. A split second sound at the base of the heart is occasionally heard in normal subjects, but when marked, reduplication raises the suspicion of systemic or pulmonary hypertension with asynchronous closure of the aortic and pulmonary valves. A third sound, heard shortly after the second sound in the region of the apex, is present in most children and many young adults. It is usually somewhat lower in intensity than the second sound. If accentuated or found in middle-aged or older persons, it raises the suspicion of organic heart disease. When the third sound is pronounced and distinctly separated from the first and second sounds, it is responsible for gallop rhythm.

Effort Syndrome

The main characteristic of effort syndrome (neurocirculatory asthenia or soldier's heart) is the production of the usual effects of severe exertion by comparatively slight effort. Dyspnea, tachycardia, perspiration, tremulousness, giddiness, heart consciousness and often precordial pain and precordial tenderness are the salient features. Tachycardia and dyspnea may disappear only gradually at the termination of exercise. Those afflicted with effort syndrome frequently show poor posture, flabby muscles, poor nutrition or marked obesity, a labile blood pressure and cool, moist cyanotic extremities. Emotional and vasomotor instability is usually evident, and a varying nervous increase in the blood pressure may be found at the time of examination, with elevation of the systolic but only a slight or no rise of the diastolic pressure above normal. The hyperactive heart, associated not infrequently with systolic murmurs, raises the question of organic disease; in other cases, the forcible muscular thrust of the left ventricle, sharp heart sounds, tachycardia, tremor and perspiration simulate thyrotoxicosis. On palpation, a false impression of enlargement may be obtained because the vigorous impact of the heart is transmitted outside the true apex beat. In determining the point farthest to the left and farthest downward where the heart action is felt, great care must be taken in these cases to locate it with the fingertips in the soft interspace. Organic heart disease is usually excluded by the absence of other corroborating features. Thyrotoxicosis can usually be differentiated readily by the clinical findings, but in some cases measurements of heart rates during rest or sleep and of the basal metabolic rate may be necessary.

Systolic Murmurs

Although aortic diastolic murmurs may be due to functional relative insufficiency of the valvular orifice in the presence of arterial hypertension or severe anemia, diastolic murmurs are generally among the most reliable signs of heart disease. Systolic murmurs are of more doubtful significance. The best tests of the significance of systolic murmurs are observations on the effects of posture and respiration.[33] Even loud systolic murmurs may lead to erroneous diagnoses if the possibility of their cardiorespiratory origin is not tested by their relation to the respiratory cycle. If a murmur is completely absent at certain phases of respiration, it is unlikely to have an organic basis. If the murmur is present only in the erect position or is entirely absent in the erect position, it is probably functional in its origin. The commonest systolic murmur in normal subjects is heard with maximal intensity in the pulmonic area in the left second interspace and may be transmitted elsewhere over the precordium. Functional systolic murmurs are also frequently present at the apex in normal, rapidly beating hearts, are blowing in quality, are unassociated with other more reliable evidences of heart disease, such as

enlargement and diastolic murmurs, and are characteristically variable on repeated examinations or on change of position. Innocent systolic murmurs may be associated with systolic thrills in patients with overactive hearts and thin chest walls.

The systolic murmur and thrill at or above the pulmonic area, which are due to pulmonic stenosis or to patent ductus arteriosus, the systolic murmur heard over the aortic area and transmitted to the great vessels of the neck, which is due to aortic stenosis, the systolic murmur heard over and to the right of the midsternum, which is due to interventricular septal defects, and the systolic murmur due to organic mitral valvulitis can almost always be readily differentiated by their association with other definite evidences of heart disease. These consist of diastolic murmurs, cardiac enlargement, cyanosis or other abnormalities in the heart sounds. The rough and more intense systolic apical murmurs heard in young patients with active rheumatic fever, or in old arteriosclerotic ones due to changes in the mitral valve, often partly replace the first sound.

When confronted with the presence of loud systolic murmurs that are only slightly affected by position or respiration and are not clearly associated with other evidences of heart disease, anemia, infectious disease, thyrotoxicosis or other conditions leading to relative mitral insufficiency resulting from dilatation of the left chambers, the physician usually resolves the problem by further radiographic and electrocardiographic studies. Such murmurs usually prove to be of pathologic significance. X-ray examination is desirable when the presence or absence of enlargement must be established and when, in congenital and valvular disease, the contours of the heart may confirm the diagnosis.

Precordial Pain and Tenderness

Precordial pain and tenderness in young persons, if unassociated with definite signs of heart disease, are always of functional origin. They are particularly likely to occur in patients with effort syndrome or in those who are under emotional tension or who are debilitated because of illness. In some cases, a recurring irregularity of the heart action gives rise to these complaints because of a hypersensitive nervous system. Nonanginal precordial pain is almost constant in some persons and is not aggravated by exertion. It is sometimes described as a diffuse, dull aching, with or without radiation to the arm. In other subjects, the symptoms are fleeting or momentary and are described as a "jabbing," "stabbing," "catching" or "electric-shock" sensation, with a duration of but a second or two. The ache or pain is frequently referred to the apical region and may be sharply localized to a small area. The underlying pathologic physiology of such hyperalgesia and hyperesthesia has been described elsewhere.[41] The fact that this type of precordial distress is also present in some patients with definite heart disease should not lessen the confidence of the physician in its benign nature in the absence of heart disease.

In older persons, the possibility of angina pectoris must always be considered. The facts that angina pectoris may be the sole clinical expression of coronary arteriosclerosis and that the diagnosis often rests largely on the patient's subjective sensations add to the difficulty of the diagnostic problem. A painstaking inquiry into the nature of the symptoms resolves many perplexities. The five main diagnostic characteristics of angina pectoris have been described and analyzed clearly by Riseman and Brown.[42] In their experience, all patients with angina pectoris showed five diagnostic characteristics in common: the onset of the attack is sudden; the duration is short — usually more than a few seconds, but less than fifteen minutes; the symptoms are difficult to describe, consisting in pain, pressure, squeezing, choking or their equivalents; the region involved is the anterior chest (including the epigastrium) and the inner aspects of the arms (especially the left), radiation of the discomfort being significant, if it occurs; and the attacks are precipitated by exertion or emotion, eating or chilling. Patients who lack one or more of these five features usually have either noncardiac disease as the cause of their symptoms or angina pectoris in addition to some complicating disease. The confusion that arises is usually due to the following: difficulties in obtaining an adequate history; symptoms arising in the chest that simulate angina pectoris; angina pectoris, which simulates other diseases such as neuritis and peptic ulcer; and angina pectoris occurring simultaneously with other conditions, such as gall-bladder disease.

Any symptom localized to the region of the anterior chest and within the midclavicular zone that occurs on exertion or emotion and disappears on rest must be considered as indicative of angina pectoris until proved otherwise. The numerous considerations that enter into differential diagnosis are available in many texts and communications.[42, 43] It should be recalled that although the results of physical examination and radiographic and electrocardiographic studies are frequently of great diagnostic aid, angina pectoris of typical symptomatology has been found without any abnormalities in heart size, blood pressure or electrocardiographic tracings in 26 per cent of a care-

fully studied group of 100 proved cases.[42] Conversely, slight changes in electrocardiographic tracings occur in a significant proportion of persons of this age group in the absence of angina pectoris.[44]

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27461

PRESENTATION OF CASE

A fifty-one-year-old Greek bootblack entered the hospital complaining of pain in the right hip.

One year before admission, the patient developed a dull ache in the right hip; it was noticeable only when he was standing. He attributed the pain to a right inguinal hernia, for which he had been wearing a truss. Six months passed, and the patient's discomfort reached a point where he was forced to stop working. He walked with a limp, and the pain radiated from the iliac crest down the outer aspect of his leg. It was greatly aggravated by weight bearing and relieved almost instantly by lying down. Because his physician suspected a focus of infection, all the patient's teeth were extracted; but the pain continued, and three weeks before admission it was no longer relieved by lying down. At this time, he noticed a weakness in his right leg, which often became tired and numb. In addition, he developed urinary frequency and nocturia (once a night). He had lost 10 pounds in the preceding six months.

The past and family histories were irrelevant.

On examination, the patient was well developed and nourished and in no apparent distress. He was edentulous. The heart was slightly enlarged, and there was a soft systolic murmur at the base. Examination of the lungs was negative. There was a slight fullness of the right side of the abdomen, and a right indirect inguinal hernia. Moderate tenderness and fullness were present in the right sacroiliac region. Examination of the nervous system was negative except that the left knee jerk was slightly more active than the right. Rectal examination was negative.

The temperature, pulse and respirations were normal; the blood pressure was 132 systolic, 80 diastolic.

Examination of the urine was negative, and no Bence-Jones protein could be demonstrated. A phenolsulfonephthalein test was normal. Examination of the blood showed a red-cell count of 5,700,000 with a hemoglobin of 102 per cent, and a white-cell count of 7600. The corrected sedimentation rate was 1.3 mm., and the hematocrit reading 50 per cent. The nonprotein nitrogen of the blood serum was 31 mg., the serum proteins 6.4 gm., the calcium 13.5 mg., and the phosphorus 2.58 mg. per 100 cc.; the phosphatase was 5.5 Bodansky units. A blood Hinton reaction was negative. Examination of the stools was negative.

X-ray study of the pelvis showed a large multilocular defect involving the medial half of the right ilium. The outline of the defect was irregular but well defined, and the cortex was destroyed in several places. A questionable soft-tissue mass was visible in the region of the ischial spine. Multiple septums were visible within the area of destruction. Films of the extremities and chest were negative. An x-ray film of the skull showed two rounded areas of decalcification that were considered to be venous lakes. A chest plate was negative. An intravenous pyelogram showed prompt excretion on both sides. The kidney pelves were not completely visible because of overlying gas. There was no definite evidence of renal disease.

On the eleventh hospital day, an exploration of the neck for a parathyroid tumor was performed. The left lower and both upper parathyroid glands were found and appeared normal. The right lower gland could not be identified.

DIFFERENTIAL DIAGNOSIS

DR. JOSEPH C. AUB*: The blood calcium was at a high level; the blood phosphorus was low. This x-ray film of the pelvis gives a different impression from what I expected from reading the report. The periosteum of the ilium shows a complete break. It looks to me as if there were a large tumor there, and the rest of the bones look quite normal. Is there a film of the hand?

DR. AUBREY O. HAMPTON: No.

DR. AUB: This picture will influence me considerably, for hyperparathyroid lesions of bones do not cause destruction of the periosteum, and malignant tumors, of course, are associated with such destruction.

DR. HAMPTON: In this pyelogram, I cannot see anything in the kidneys. The kidney outlines and pelves are normal. I am not imagining all this, in spite of the fact that the films are poor. I think you can see that the kidneys are fairly normal.

DR. AUB: Here is a man who had a tumor mass in his pelvis, with no other abnormality on x-ray study. The bones look quite well; there is no evidence of the characteristic osteoporosis of the hyperparathyroid state. The blood calcium was

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high, the blood phosphorus low, and the total protein normal; no Bence-Jones bodies were found in the urine. I am surprised at the tumor mass. I do not like this lesion. It does not look like one due to hyperparathyroid disease, but I probably should have advised operation just as others did.

Then the question arises whether this patient had a parathyroid tumor deep in the chest. The lower parathyroid glands may go down in the chest along with the thymus; I assume that at operation the upper part of the chest was explored.

I see that Dr. Albright wants to say something. Do you want to help me, Dr. Albright?

DR. FULLER ALBRIGHT: No; I want to hinder you. I see that Dr. Hampton is putting up more films. I do not want him to show you too much.

DR. AUB: All right. I assume that the chest was explored, but one cannot always find parathyroid tumors situated down in the chest simply by exploration from a neck incision: one has to open the chest to explore properly.

The reason one would be so anxious to find a parathyroid tumor in this patient is not that the blood calcium was high, but that the blood phosphorus was low. Most patients with osteoclastic tumors have a normal blood phosphorus, although they may have a high blood calcium — as high as 15 or 16 mg. per 100 cc.

What is the differential diagnosis? It is obviously hyperparathyroidism, multiple myeloma, hypernephroma or a carcinoma of the breast, which is very rare in men. The diagnosis of prostatic tumor is much less likely because the metastases of this tumor are not osteoclastic. I rule out myeloma because the high blood calcium in multiple myeloma is practically always associated with high total protein in the blood stream, which was not found in this patient. I rule out breast tumor because it is not reported in the record. I rule out prostatic tumor simply because it does not look like it. Might I ask if exploration of the upper mediastinum was done?

DR. ALBRIGHT: It was done from above. They went down as far as they could but did not feel anything.

DR. AUB: When I first read the report, my diagnosis was hyperparathyroidism, with tumor in the mediastinum, and my second choice was hypernephroma, in spite of the negative urine and in spite of the x-ray examinations that were reported negative. Now that I see the x-ray films, I really think the kidney shadows do not stand out well.

DR. HAMPTON: Here are two more films taken at the same time. They are not much better. They have the same general appearance.

DR. AUB: Do they satisfy you?

DR. HAMPTON: No; they are unsatisfactory. I think you are correct in saying that the examination was poor.

DR. AUB: The x-ray appearance of the pelvis looks as though it were due to a malignant tumor, whereas the chemical analyses are proper for hyperparathyroidism. Then there is the problem of the soft-tissue mass and also of the weakness in the leg, which implies peripheral-nerve involvement. Largely on the basis of the x-ray films, I am going to make a diagnosis of malignant tumor and not of parathyroid tumor situated in the mediastinum. I did not plan to make that diagnosis when I came here. If I were in charge of the case, what I should propose doing next would be to take a biopsy of the tumor in the bone, before recommending the second operation of cutting the sternum and looking in the upper mediastinum. The most likely diagnosis of the malignant tumor would be a hypernephroma in spite of the normal urine, because it is the most probable malignant osteoclastic tumor.

DR. HAMPTON: This kidney pelvis does appear to have a defect in the superior margin.

DR. ALBRIGHT: We were influenced by another case we had seen before, which I thought was a dead ringer for the case under discussion. That patient had also had pain in the hip, and the roentgenogram demonstrated a lesion in the ilium very similar to the one in this case. Dr. J. H. Means was asked to see the other patient in consultation, and he considered diagnoses of multiple myeloma and hyperparathyroidism, and ordered serum calcium and phosphorus determinations, as well as a search for Bence-Jones protein in the urine. The serum calcium was high, 13 mg., and the serum phosphorus low, 2.0 mg.; small amounts of what was thought to be Bence-Jones protein were found. Accordingly, the consultation was not much help. Some of us thought that the patient had hyperparathyroidism; others considered multiple myeloma. We decided to biopsy the lesion; both sides were apparently wrong. He had an enchondroma, which was removed. The Bence-Jones proteinuria disappeared, but the hypercalcemia persisted. At a somewhat later date, the parathyroid glands were explored, and the

diagnosis of hyperparathyroidism was substantiated.

DR. HAMPTON: I should like to disagree with Dr. Albright. The two cases are not entirely similar. The cortex of the bone is destroyed in the present case, and intact in the other.

DR. ALBRIGHT: Why could not a benign tumor destroy the cortex?

DR. HAMPTON: It expands but does not destroy it, because bone destruction is due to vascular pulsation rather than to tumor invasion.

DR. TRACY B. MALLORY: The next step was what Dr. Aub said that he would advise — a biopsy of the tumor of the ilium. That was done and showed obvious hypernephroma. At that stage, they began to have doubts about the intravenous pyelogram, and a retrograde film was taken, which Dr. Hampton will now show us.

DR. HAMPTON: I might point out that this is the third case within a month in which a serious error has been made by relying on the intravenous pyelogram when a retrograde pyelogram would have told the story. The retrograde pyelogram shows a definite filling defect in the upper calyxes. I think it is true, however, that the kidney presented a normal outline on its lateral surface. If we had taken a lateral view and demonstrated the kidney, we should have seen the mass in front of or behind the kidney. This case misled us because a hypernephroma ordinarily presents on the lateral margin.

DR. ALBRIGHT: Why a person should have a high serum calcium and a low serum phosphorus when the cause of the disturbance is a tumor destroying bone is an interesting theoretical question. We treated this case by radiation of the tumor masses; the serum calcium went down to normal, and the serum phosphorus went up to normal. Gradually, both values became abnormal again. I suspected that the tumor might be producing parathyroid hormone. I therefore had it assayed by Dr. J. B. Collip, but no hormone was found.

CLINICAL DIAGNOSIS

Hypernephroma, with metastases to right ilium.

DR. AUB'S DIAGNOSIS

Hypernephroma, with metastases to bone.

ANATOMICAL DIAGNOSES

Hypernephroma of right kidney, with metastases to right ilium, fifth lumbar vertebra, sacrum and left ilium.
Bronchopneumonia.
Arteriosclerosis, coronary, slight.
Emaciation.
Decubitus ulcer.
Operative scar: parathyroid exploration.

PATHOLOGICAL DISCUSSION

DR. TRACY B. MALLORY: This patient survived nearly three years, and finally died and came to autopsy. He was found to have a still fairly small hypernephroma of the right kidney but a large tumor involving most of the right side of the pelvis. The fifth lumbar vertebra, the sacroiliac joint, a good deal of the sacrum, and the symphysis pubis had all been destroyed by direct invasion.

DR. AUB: Were there any other metastases to the bones?

DR. MALLORY: Neither grossly nor microscopically. A good deal of the bone marrow was aplastic, almost certainly as the result of x-radiation, although there were foci of moderate hyperplasia.

DR. OLIVER COPE: What was the cause of death — intercurrent infection?

DR. ALBRIGHT: The patient got weaker and weaker, and died.

A PHYSICIAN: Did they find the other parathyroid gland?

DR. MALLORY: At autopsy, yes. It was not neoplastic.

DR. AUB: It was normal?

DR. MALLORY: Yes.

CASE 27462

PRESENTATION OF CASE

A seventy-six-year-old man was admitted to the hospital because of severe abdominal pain of four to five hours' duration.

Eight months before entry, he had a brief bout of abdominal cramps lasting about ten minutes. Three weeks before admission, he experienced a similar episode, which responded well to a little whiskey. The patient stated that he began to have pain in the umbilical region two days before coming to the hospital. His relatives, however, who seemed to have watched him closely, were sure that he had been quite well until early on the morning of admission. At this time, he was found groaning from severe abdominal pain, which centered about his umbilicus. A local physician thought that the patient had a perforated ulcer, gave him morphine, and sent him to the hospital.

The patient had practically always enjoyed good health. His weight had been constant for some

time, his appetite was good, and his bowels had been regular, with no recent change in habits or in the character of the stools. Twenty-five years before entry, he had "stomach ulcers," which disappeared within several weeks after treatment of unknown variety. One of his daughters had died of "pelvic cancer."

On examination, the patient was an elderly, slender man with dry, pale skin; he was groaning from pain. His abdomen was convex, tympanitic and tense, with considerable voluntary spasm. There was marked tenderness, most pronounced in the periumbilical region and right lower quadrant. No masses or hernias were present. The heart and lungs were not remarkable. The right eye was blind because of a cataract.

The temperature was 102.4°F., the pulse 104, and the respirations 34. The blood pressure was 130 systolic, 75 diastolic.

Examination of the blood showed a red-cell count of 4,200,000, and a white-cell count of 12,500 with 5 per cent mature polymorphonuclears and 80 per cent immature polymorphonuclears.

A flat roentgenogram of the abdomen showed a large quantity of air beneath both sides of the diaphragm. No dilated loops of small bowel were visible.

Aspiration of the abdomen gave thin, slightly milky fluid. Culture of this fluid grew colon bacilli and hemolytic streptococci.

Exploratory laparotomy was performed under local anesthesia on the morning of entry.

Differential Diagnosis

Dr. Henry Faxon: Does the x-ray film add anything?

Dr. James R. Lingley: No; it just shows the air beneath the diaphragm, as described.

Dr. Faxon: Does it show dilatation of the large bowel?

Dr. Lingley: No.

Dr. Faxon: Any of the small bowel?

Dr. Lingley: No.

Dr. Faxon: The salient features of this case are that the patient was an elderly man, apparently in previous good health, who suddenly developed an acute condition of the abdomen, with a large amount of free gas beneath both diaphragms. He obviously had a peritonitis, and the most arresting single finding was the presence of this gas.

Such collections of subphrenic gas may arise from three main sources. The first is the introduction of air by perforation of the abdominal wall or diaphragm by trauma or surgery. The history in this case makes it certain that air was not introduced into the peritoneal cavity from without.

The second cause of gas beneath the diaphragm is peritoneal infection with gas-forming organisms. However, if it had been infection in the peritoneal cavity, with the secondary formation of gas, one would expect a longer story and localization of the process beneath the diaphragm on but one side.

The third cause of such gas is the perforation of a hollow viscus, which seems the most likely explanation in this case. Such a perforation could come about in one of two ways — secondary either to an obstruction of such severity that the bowel ruptured or to erosion through a localized ulcerative area. If it were due primarily to obstruction, it would certainly seem that this patient should have had a longer story. The episodes of abdominal cramps referred to in the history eight months and again three weeks before seem to me of too short duration to have any real significance on this basis. I can hardly believe that they represented temporary obstruction that straightened out, although conceivably they might have been due to a volvulus of the colon. Such a condition is common in men and in elderly people, and might have gone on to the point of actually causing perforation in the attack that brought the patient to the hospital, but that seems extremely unlikely.

The perforation of the hollow viscus must have been due to erosion of some actual lesion through the wall of the gastrointestinal tract. Of such lesions, one possibility would be cancer, but it seems to me that with cancer of the rectum or sigmoid the patient would have had either some change in bowel habit or blood in his stools, during the recent past. Had he had a malignant lesion of the right colon, he might well have had very few symptoms, but it would be extremely rare for such a lesion to go on to the point of perforation with a red-cell count of 4,200,000. Lymphoma is another possibility, for the fluid they aspirated from the abdominal cavity was milky and much more consistent with such a diagnosis than with perforation of the colon.

The pain was chiefly periumbilical and in the right lower quadrant, which suggests that this was referred from the region of the terminal ileum, appendix or cecum. The patient might have had acute appendicitis, with an abscess that ruptured, for we know that in elderly patients the story is often atypical. The reference of pain would have been quite in keeping with this diagnosis, and

the fact that no mass was felt means but little, for the abdomen was apparently so tender and distended that I doubt if a mass could have been made out at the time of entry. However, I have never heard of a rupture of an appendix that caused the escape of so much free gas in the peritoneal cavity that could be demonstrated beneath both diaphragms.

Diverticulitis is another lesion of the bowel that could perforate; it is not usually associated with bleeding by rectum or anemia, does not give rise to many antecedent symptoms, and can perforate with the escape of gas in the peritoneal cavity. However, the signs and symptoms of diverticulitis are characteristically in the left lower quadrant, whereas it seems to me that in this case the localization of the pain was too much on the right side to make diverticulitis seem likely.

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The doctor who referred the patient here sent him in with a diagnosis of perforated ulcer, which, despite certain definite objections, seems to me the most likely diagnosis. A perforated ulcer is one of the few lesions that give rise to the escape of such a large amount of gas. Such a lesion might well cause gas beneath both diaphragms; furthermore, with the obliquity of the attachment of the mesentery, the gastric fluid as it gravitated downward would give rise to pain more on the right than on the left side. The ulcer story of the past is so vague that it means but little. I am distinctly surprised that colon bacilli were cultured when the perforation was only four or five hours old. My final diagnosis is peritonitis due to dissemination of intestinal contents from erosion through the gastrointestinal tract, most probably perforation of a peptic ulcer.

Dr. Robert Linton: Did Dr. Faxon include carcinoma as a possibility?

Dr. Faxon: Carcinoma of the stomach is certainly a good possibility, but if the lesions had been malignant, the patient would probably not have been in such good health up to the time of entry.

Dr. Allen G. Brailey: What about ulcer of a Meckel's diverticulum?

Dr. Faxon: I think it would be extremely unlikely for a patient to show the first symptoms and suffer a perforation of a Meckel's diverticulum at the advanced age of seventy-six. Periumbilical pain would be quite in keeping with a Meckel's diverticulum that had gone on to the point of perforation, but I should not have expected the gas seen under the diaphragm to have occurred unless in the x-ray plate there were signs of small-bowel obstruction behind the Meckel's diverticulum.

Dr. Arthur W. Allen: Are you not worried about the story of periumbilical pain of two days' duration?

Dr. Faxon: I am very much worried about it. When I first read over this case, I thought the patient certainly had a perforated ulcer, but the more I studied it the more I worried over the atypical localization of the pain.

Dr. Allen: I think they should tell you whether the fluid had an odor to it.

Dr. Faxon: I hoped that they might.

Dr. Tracy B. Mallory: Dr. Ulfelder, will you tell us about that?

Dr. Howard Ulfelder: Our differential diagnosis ran much like Dr. Faxon's but we never seriously entertained a diagnosis other than that of perforated ulcer. His condition was good preoperatively. We operated under local anesthesia through a right upper-quadrant paramedian incision. On opening the abdomen, we found free, nonodorous milky fluid that seemed to come from the right gutter. Exploration of the duodenum and stomach anteriorly revealed no evidence of perforation or disease. We opened the mesocolon below the stomach and explored the lesser cavity, the posterior aspect of the stomach and the duodenum, and still found no cause for the disease. We then turned our attention to the right gutter and, in tracing down into the pelvis, were suddenly greeted with a gush of foul-smelling, thin fluid. His condition became much worse. We believed that the patient had a perforation of the large bowel, of unknown cause. No further surgery was attempted, since the blood pressure dropped so low that it could not be measured. The wound was closed without drainage, and the patient was sent back to the ward for a futile attempt at conservative therapy.

Clinical Diagnosis

Perforated peptic ulcer.

Dr. Faxon's Diagnoses

Perforated peptic ulcer.
General peritonitis.

Anatomical Diagnoses

Carcinoma of sigmoid, with perforation.
Diverticulosis of sigmoid.
Peritoneal abscess, pelvic.
Peritonitis, acute, generalized.
Pneumoperitoneum.
Laparotomy.
Prostatic hyperplasia.

Pathological Discussion

Dr. Mallory: At autopsy, we found in the large bowel a number of diverticulums. At first, we were suspicious that one of these had ruptured, but they all seemed intact. Finally, just at the rectosigmoid junction, we found a carcinoma with a deeply penetrating central ulceration that had perforated into the abdominal cavity just above the pelvic floor. There an abscess had formed and had evidently been present for some time, since there was dense fibrinopurulent exudate over all the viscera in this area. In the upper abdomen, there was a generalized milder and evidently more recent peritonitis. I should think that the perforation of the carcinoma and the formation of the pelvic abscess preceded entry to the hospital by a number of days, and that the acute symptoms probably represented a rupture of that abscess into the general peritoneal cavity. Why the pain was periumbilical, I cannot say.

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APPROVING AUTHORITY

The attention of the members of the Massachusetts Medical Society is directed to a letter and enclosures that have been received by the Secretary from Dr. Stephen Rushmore, chairman of the Massachusetts Approving Authority for Colleges and Medical Schools. This correspondence should make for a better understanding of a matter that provoked considerable discussion at the October 1 meeting of the Council.

Much dissatisfaction, of late years, has been expressed with the Massachusetts Medical Practice Act. It has been described as archaic and most certainly not in keeping with the advances in the science of medicine. As the result of this dissatisfaction, the act was amended in 1936 to create an approving authority in whose hands would be the power to set up minimum standards for colleges and medical schools that must be met if the graduates of these colleges and medical schools were to be permitted to take the examinations offered by the Massachusetts Board of Registration in Medicine. The amended law provided that the initiative in seeking the approval of this authority must come from the school whose graduates wish to be licensed in Massachusetts.

In the same session of the Legislature, this act was further amended on the advice of Governor Curley. When the bill was presented to the Governor for his approval, he said that he was very much in favor of the thought behind it. He believed, however, that because the decisions of the Approving Authority might involve the property rights of certain individuals,—owners of schools and students whose education represented property rights,—the bill should provide for a review of certain of the decisions of the Approving Authority by a judge of the Superior Court. He added that the property rights of the individual are guaranteed by the Constitution and that the open recognition of this principle in the bill would add strength to the bill itself.

The bill went back to the Legislature and was amended to incorporate this suggestion of the Governor. While it was taking this second trip through the Legislature, it was still further amended to postpone the date of its operation until 1939. The proponents of the bill accepted this latter amendment because it was pointed out that, if this bill became effective immediately, certain schools and certain individuals who had matriculated in those schools in good faith might be seriously affected. The thought that some schools should be afforded reasonable time to improve their standards had considerable appeal to the legislators.

The law was again amended in 1938 to extend further its date of operation. The language of this latter amendment is contained in Chapter 247, Acts of 1936, Section 3, as amended. Dr. Rushmore's letter quotes this section. It is particularly referred to here because it does seem to clarify a matter that was discussed at length at

the October 1 meeting of the Council, when the President and Secretary were directed "to give their attention to this matter with a view of enlightening the Council as to what the situation is."

The situation may be briefly stated as follows: an approving authority for colleges and medical schools is now functioning in Massachusetts. This authority has already inspected all medical schools in Massachusetts that have requested inspection and has approved three of these. The initiative for such an inspection must come from the college or medical school. Certain decisions of the Approving Authority are subject to a review by a judge of the Superior Court, sitting in Suffolk County.

Applicants who matriculated in a medical school previous to January 1, 1941, cannot be barred from taking the examination for licensure in Massachusetts even though the school from which they graduated has not been endorsed by the Approving Authority at the time of graduation.

THE SCHOOL-LUNCH PROBLEM IN BOSTON

In the September 18 issue of the *Journal*, an editorial commented on the nutritional deficiencies commonly found in American diets and on the consequent importance of the school lunch for children. Since then, a report by the Advisory Committee on School Hygiene,* dated April, 1940, and dealing with the school-lunch problem as it exists in Boston, has been received. The recommendations in the report are so significant that they are quoted in full:

(1) The situation regarding school lunches for pupils in the public schools of Boston presents problems worthy of careful and prompt consideration by the School Committee.

(2) A thorough reorganization of the system of providing lunches for the pupils is urgently needed.

(3) To accomplish this result, responsibility for the management of the cafeterias in all the public schools of Boston should be placed in the hands of a single director.

(4) Besides the fundamental requirement of high character and organizing ability, the director should have excellent training in and a thorough knowledge of nutrition, as well as training and experience in lunchroom management and the preparation of attractive, palatable food. The appointment of such an individual will require careful consideration. The professional qualifications required for work of this kind have been studied by the American Dietetic Association and the American Home Economics Association.

(5) The functions of the proposed director should include the purchase of food and the supervision of menus, as well as the management of the cafeterias. The qualifications for lunchroom managers should be carefully drawn up, so that efficient workers may be obtained.

(6) The director should endeavor to exemplify in the lunchrooms the dietetic and hygienic principles taught in the schools.

(7) The sale of undesirable foods, such as candy and tonic, in the cafeterias or on the school premises should be stopped. The school children should not be allowed to leave the school premises during the lunch hour, and sales of candy or food to them by outside persons should be discouraged as far as possible.

(8) In some, if not in all the schools, more time should be allowed for lunch.

(9) In some of the schools, the lunch program will require improved cafeteria facilities, more equipment, and better hand-washing facilities and more soap and towels.

(10) Adequate reorganization demands replacement of unqualified cafeteria managers by suitably trained personnel. These should have faculty standing in order that they may be in a position to confer with the school administrators, teaching staff and school-health group on common problems of nutrition education.

(11) The director should exercise authority not only over all the cafeterias in the schools, in so far as they serve the children, but also over the following additional activities: food service to nutrition classes; distribution of milk and other foods; and lunches served to teachers or others, if any.

*This committee is an official body appointed by the School Committee of Boston. The report was presented to the School Committee after having been approved by the Director of School Hygiene.

These recommendations received favorable action by the School Committee, and money was recently appropriated to pay the salary of such a director. The Civil Service Commission, in accordance with law, has circulated a notice of an examination to be taken, on November 22, by applicants for the position of "Supervisor of School Lunches."

As stated in the notice, the duties of the supervisor are as follows:

> To draw up specifications for the purchase of food supplies; to standardize recipes for the school lunchrooms; to plan menus based upon adequate nutrition standards; to have supervision of all menus, of the direction and preparation of school lunches, of the distribution of milk and other supplies and of lunchroom sanitation; to analyze equipment on hand in the lunchrooms and recommend redistribution; to develop nutrition education through correlation with the health-education program; and to perform related work as required.
>
> A knowledge of cost accounting is necessary.
>
> Applicants must have executive ability adequate to meet organization requirements for the establishment of a city-wide lunch system, and ability to work with and to direct the work of others.

This new office will be a position of prime importance for the health of Boston's school children. All persons interested in their welfare will recognize that the children should receive school lunches, at minimum cost, that compare favorably with those provided by other forward-looking communities.

Unfortunately, certain conditions raise a question concerning the adequacy of the provisions for obtaining a properly qualified person. Firstly, regulations require that applicants be citizens domiciled in the State at least a year and in Boston at least six months. Since a school-lunch system of this scope is nonexistent in Massachusetts, this provision limits the examinees to persons having comparatively little experience. Secondly, the General Laws provide for veterans' preference among applicants passing with grades above 70 per cent. Thirdly, the salary is less than those paid to the holders of similar positions in cities smaller than Boston. And, finally, there is no limitation concerning age. It is hoped that the written examination will be so inclusive and the physical examination so thorough that they can be passed only by persons who are adequately trained and physically fitted to perform the important and arduous duties of the new office.

MEDICAL EPONYM

Landry's Paralysis

Dr. Jean Baptiste Octave Landry (1826–1865) published "Note sur la paralysie ascendante aigue [Note on Acute Ascending Paralysis]" in the *Gazette hebdomadaire de médecine et de chirurgie* (Paris) (**6:** 472–474 and 486–488, 1859). A portion of the translation follows:

> The object of this note is to call attention to a morbid condition that is rather uncommon and generally unknown but deserves a place among the most remarkable diseases in the pathological category.
>
> In these cases, the symptoms, beginning in the extremities, successively involve the upper portions of the body, those more central relatively to the nervous system becoming gradually augmented in intensity in the invaded organs. These symptoms frequently tend to become general, and then produce a definite *general paralysis* with all the characteristics of that of the insane. . . .
>
> I simply add that, nearly always slowly progressive, it occasionally runs a very rapid course, and may become serious or even fatal in a very short time. It is this variety that I propose to designate *ascending* or *acute centripetal paralysis.*

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

APPROVING AUTHORITY

The following letter and enclosures were recently received from Dr. Stephen Rushmore, chairman of the Approving Authority for Colleges and Medical Schools, and are reprinted for the information of the members of the Massachusetts Medical Society.

Michael A. Tighe, *Secretary*

* * *

Dear Dr. Tighe:

In reply to your letter of inquiry on the part of the Massachusetts Medical Society as to the work of the Approving Authority for Colleges and Medical Schools, I regret that the nature of our work precludes the giving out of full details since so much of the information which comes to us may properly be regarded as confidential.

I may say, however, that, under the statute, the initiative rests with the institution seeking approval, and that the Approving Authority has inspected all the medical schools in Massachusetts that have requested inspection. Following inspection, the Approving Authority has approved the medical schools of Boston University, Harvard University and Tufts College.

Attention should be called to the fact that no applicant for examination for registration as a physician may be

rejected by the Board of Registration in Medicine as a graduate of a nonapproved school until 1945. Chapter 247, Acts of 1936, Section 3 (as amended), reads as follows:

> The provisions of said section two of said chapter one hundred and twelve as existing immediately prior to January first, nineteen hundred and forty-one, shall continue to govern as to the eligibility of any applicant for registration as a qualified physician who shall have matriculated prior to said date in any legally chartered medical school having power to confer degrees in medicine, but subject, however, to the provisions of section two of chapter one hundred and seventy-one of the acts of nineteen hundred and thirty-three.

Attention should be called also to the fact that the statute specifies that one of the conditions of eligibility for examination by the Board of Registration in Medicine is that the candidate "has received the degree of Doctor of Medicine . . . from a legally chartered medical school . . . approved by the Approving Authority. . . ." Presumably, this means approved by the Approving Authority at the time when the degree was conferred.

I enclose a copy of the "Requirements for Approval of Colleges, Universities and Medical Schools," published in 1936 by the direction of the statute, and a copy of Section 2, Chapter 112, of the General Laws as most recently amended.

The statute of 1936, as amended in 1938, thus gave medical schools nearly five years in which to meet the requirements published in 1936 before inspection with effective approval or nonapproval could occur.

STEPHEN RUSHMORE, M.D., *Chairman*

State House
Boston

REQUIREMENTS FOR APPROVAL OF COLLEGES, UNIVERSITIES AND MEDICAL SCHOOLS

Qualifications Required for Approval of a College or University as Giving Two Years of Premedical Collegiate Work, including Physics, Chemistry and Biology

The institution will be approved if it has already been approved by the Association of American Universities or the Regional Association of Colleges and Secondary Schools in the territory in which the institution is located.

Since approval by the above-noted organizations may be lacking because it has not been sought or has been refused, and since an educational institution should be judged by its objectives and its adequacy in attaining these objectives, specific requirements may present considerable variation. The following general requirements have, however, been established:

(1) The curriculum should presuppose educational qualifications required for graduation from a public high school as a condition for entrance to the institution.

(2) The instruction should be at the collegiate level generally required of institutions giving similar curricula in the regional group.

(3) Since the teacher is the heart of an educational institution, the competence of the faculty, the organization of the faculty, the working conditions for the faculty and the quality of the instruction will receive special attention.

(4) The physical facilities, including library, must be adequate for the objectives of the institution.

(5) The administrative organization and personnel should be adequate for accomplishing the objectives of the institution.

(6) The institution should provide evidence of financial resources adequate for and effectively applied to the support of its educational program.

Qualifications Required for Approval of a Medical School

The minimum requirements for an approved medical school as set by the statute and by ruling of the Approving Authority under the statute are as follows:

(1) The school must be legally chartered.

(2) If the school confers degrees in medicine, the school must be legally empowered to confer degrees in medicine.

(3) If the school confers degrees in medicine, the school must see to it that the statutory conditions are fulfilled, namely, that the candidate shall have taken a course of at least four years of not less than thirty-two weeks in each year before the degree is conferred.

(4) If the power of the school to confer degrees is restricted under the charter, the degrees conferred must be under the restriction of the charter.

(5) The school must restrict admission of candidates to those who have had at least two years of premedical work in an approved college, including courses in physics, chemistry and biology.

(6) A candidate seeking admission to an approved school, after attendance in a nonapproved school, must receive specific approval from the Authority both as to admission and status after admission.

(7) A candidate admitted to advanced standing must spend at least one year in the school, completing the regular fourth or last-year course of study, if the four-year course is given, or the year next preceding the year of internship, if internship is required for graduation, before the degree is conferred. Before admission to such fourth year, the candidate seeking admission to advanced standing must fulfill all the conditions required of candidates for admission to the fourth year who have taken the uninterrupted course.

(8) The administration of the school must be under the supervision and control of a dean or other administrative officer who is familiar with contemporary medical education, its standards and procedures and who has authority adequate for the proper performance of his duties.

(9) The school must provide adequate preclinical courses in anatomy (including histology and embryology), physiology (including biochemistry and pharmacology) and pathology (including bacteriology and immunology). Average courses for these groups are approximately as follows: anatomy group 15 per cent of the whole medical course; physiology group 15 per cent; pathology group 15 per cent. The whole medical course should cover approximately four thousand (4000) hours.

(10) For the preclinical courses there should be no less than nine full-time teachers of professional rank: for anatomy group, three; physiology group, three; pathology group, three. There must be adequate full-time or part-time assistants, and technicians. This estimate is on the basis of fifty students in each class.

(11) In order that a teacher may be regarded as ade-

quate for a full-time professorship (professor, associate professor, assistant professor) he must (1) have had adequate opportunity to become familiar with his subject; (2) have had adequate experience as a teacher of his subject; and (3) have attained such a position in his profession that he is recognized by his fellow workers in his specialty as competent.

(12) The laboratories for each preclinical subject must be adequate with ample desk room for work, and locker room for supplies and equipment.

(13) Each department must have equipment adequate for its needs, for demonstration purposes as well as for routine work with students, for research by members of the faculty, and there must be a sufficient number of rooms for meetings of whole classes for lectures or demonstrations with accessory apparatus for these purposes.

(14) There must be an adequate working library for the school, with books of reference and magazine files, and tables or desks for work, under the charge of a competent librarian.

(15) There must be adequate clinical material available for teaching purposes, for all branches of medicine, with especial emphasis on medicine, surgery and obstetrics.

(16) The records of the school must be adequate to show the actual condition of the school, and the status of each student, including his premedical record.

(17) The financial statement of the school must be so presented as to show whether the school is or is not actually conducted in accordance with its charter as a noncommercial institution.

Qualifications and Examination of Applicants for Registration as Qualified Physicians

Amendment of Section 2, Chapter 112, of the General Laws (Acts of 1939, Chapter 451, Section 37), approved August 10, 1939:

Section 2. Applications for registration as qualified physicians, signed and sworn to by the applicants, shall be made upon blanks furnished by the board of registration in medicine, herein and in section three to twenty-three, inclusive, called the board. Each applicant who shall furnish the board with satisfactory proof that he is twenty-one or over and of good moral character, that he possesses the educational qualifications required for graduation from a public high school, that he has completed two years of premedical collegiate work, including physics, chemistry and biology, in a college or university approved by a body consisting of the secretary of the board, the commissioner of education and the commissioner of public health, in this section referred to as the approving authority, that he has attended courses of instruction for four years of not less than thirty-two school weeks in each year, or courses which in the opinion of the board are equivalent thereto, in one or more legally chartered medical schools, and that he has received the degree of doctor of medicine, or its equivalent, from a legally chartered medical school having the power to confer degrees in medicine and approved by the approving authority, shall, upon payment of twenty-five dollars, be examined, and if found qualified by the board, be registered as a qualified physician and entitled to a certificate in testimony thereof, signed by the chairman and secretary. An applicant aggrieved by the refusal of the approving authority to approve a medical school under this section shall be entitled to have the reasonableness of such refusal reviewed by a justice of the superior court, whose decision shall be final. An applicant failing to pass an examination satisfactory to the board shall be entitled within one year thereafter to a re-examination at a meeting of the board called for the examination of applicants, upon payment of a further fee of three dollars; but two such re-examinations shall exhaust his privilege under his original application. The board, after due notice, and hearing, may revoke any certificate issued by it to, and cancel the registration of, any physician convicted of a felony, and may, at any time after the expiration of one year thereafter, reissue any certificate so revoked, and register anew any physician whose registration was so canceled. The board, after due notice and hearing, may suspend, for a period not exceeding one year, any certificate issued by it to, and cancel the registration of, any physician who has been shown at such hearing to have been guilty of gross and confirmed use of alcohol in any of its forms while engaged in the practice of his profession, or of the use of narcotic drugs in any way other than for therapeutic purposes; or of abuse of the authority granted in section two hundred and nine A of chapter ninety-four; or of publishing or causing to be published, or of distributing or causing to be distributed, any literature contrary to section twenty-nine of chapter two hundred and seventy-two; or of acting as principal or assistant in the carrying on of the practice of medicine by an unregistered person or by any person convicted of the illegal practice of medicine or by any physician whose registration has been canceled, and whose certificate has been revoked or suspended, by the board; or of aiding and abetting in any attempt to secure registration, either for himself or for another, by fraud, or, in connection with his practice, of defrauding or attempting to defraud any person. Except as otherwise provided herein, the board may, at any time, reissue any certificate so revoked and register anew any physician whose registration was canceled.

The approving authority shall, upon the request of any college, university or medical school in this commonwealth, inspect said college, university or medical school and notify its trustees or other governing body in writing if said college, university or medical school is approved by the approving authority for the purposes of this section, or if not, what steps said college, university or medical school must take in order to gain the approval of the approving authority.

Any college, university or medical school desiring to be approved for the purpose of this section may file with the approving authority a written request for the approval of such college, university or medical school, and thereupon a public hearing shall be seasonably granted by the approving authority and a written decision made by it within twenty days after the termination of such hearing and the applicant for such approval shall be notified of such decision. A written decision of the approving authority refusing to approve any college, university or medical school shall not become effective until thirty days after written notice of such decision is given to the college, university or medical school seeking such approval. Every such college, university or medical school aggrieved by such refusal shall have the right to file a

petition in the superior court for Suffolk County to revise or reverse the decision of the approving authority. Notice of the entry of such petition shall be given to the secretary of the board of registration in medicine and all proceedings connected therewith shall be according to rules regulating the trial of civil causes without juries. The court shall hear the case and finally determine whether or not such approval shall be granted or revised.

Upon the filing of such a petition within the aforesaid period of thirty days, then the said decision of the approving authority shall not become effective until a final decree affirming said decision is entered upon the aforesaid petition.

The board shall examine an applicant who is an alien only if he presents to it a certificate from the court in which he shall have filed his declaration of intention to become a citizen of the United States, or from the Immigration and Naturalization Service of the United States, showing that he has declared his intention to become such a citizen, or a copy of such declaration of intention, certified by the clerk of such court. In case the applicant is subsequently registered, unless he shall present to the board, within five years following the filing of the certificate or certified copy hereinbefore referred to, his completed naturalization papers showing that he is a citizen of the United States his certificate of registration shall be revoked and his registration canceled. The foregoing provisions of this paragraph shall not apply to limited registration under section nine or section nine A or to any alien physician of distinguished merit and ability, duly licensed to practice his profession in any foreign country wherein the requirements for the issuance of such a license are not substantially lower than those of this commonwealth, while he is temporarily teaching in this commonwealth in a medical school approved by the approving authority.

Section 3, Chapter 112, of the General Laws (Acts of 1936, Chapter 247):

Section 3. The provisions of said section two of said chapter one hundred and twelve as existing immediately prior to January first, nineteen hundred and forty-one, shall continue to govern as to the eligibility of any applicant for registration as a qualified physician who shall have matriculated prior to said date in any legally chartered medical school having power to confer degrees in medicine, but subject, however, to the provisions of section two of chapter one hundred and seventy-one of the acts of nineteen hundred and thirty-three.

SECTION OF OBSTETRICS AND GYNECOLOGY*

Fatal Nephritis in Pregnancy

A thirty-seven-year-old para III had had no prenatal care. When she was approximately twenty-four weeks pregnant, she called a physician because of bleeding. He referred her immediately to the hospital. For two weeks, the patient had had considerable swelling of the face, abdomen and legs, with blurred vision and epigastric pain.

On examination, the blood pressure was 158 systolic, 100 diastolic. Four hours after entry, the patient delivered herself spontaneously of twins. The kidneys subsequently shut down, and the patient succumbed to uremia a week after admission. Autopsy showed chronic nephritis as the cause of death.

Comment. This death cannot be attributed to poor obstetrics; ignorance or indifference on the part of the patient was the real cause of death. Had this patient been seen early in her pregnancy, the diagnosis of chronic nephritis would undoubtedly have been made, and if the condition had not appeared serious enough to warrant abortion, she would have been under constant medical control.

It is commonly believed that any patient with nephritis who is pregnant and shows serious suppression of kidney function as early as five months must have considerable chronic kidney damage. The only way to prevent such deaths is to impress on the laity the value of early prenatal care. If this advice is not generally promulgated and if clinics are not established for all pregnant women, such a disaster as this must recur. Even though the necessity of prenatal care is well recognized and clinics are made available for everyone, no law compels the pregnant woman to accept these advantages, and a few such disasters are bound to occur.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section. Letters should be addressed to Dr. Raymond S. Titus, *Secretary*, 330 Dartmouth Street, Boston.

DEATHS

BARTLETT — Walter O. Bartlett, M.D., of Boston, died November 5. He was in his sixty-third year.

Born in Natick, Dr. Bartlett received his degree from Harvard Medical School in 1902. He was a fellow of the Massachusetts Medical Society and the American Medical Association.

His mother, a brother and a sister survive him.

EDGAR — William L. Edgar, M.D., of Athol, died October 11. He was in his seventieth year.

Dr. Edgar received his degree from the Hahnemann Medical College of Philadelphia. He was a fellow of the Massachusetts Medical Society and the American Medical Association.

LEACH — Albert C. Leach, M.D., of Orange, died November 9. He was in his seventy-first year.

Born in Portsmouth, New Hampshire, Dr. Leach received his degree from Dartmouth Medical School in 1894. He was a fellow of the Massachusetts Medical Society and the American Medical Association.

He is survived by his widow, two daughters and two sons.

LORD — Frederick T. Lord, M.D., of Boston, died November 4. He was in his sixty-seventh year.

Born in Bangor, Maine, Dr. Lord received his degree from Harvard Medical School in 1900. After interning at the Massachusetts General Hospital, he was appointed to the staff in 1903 and was a member of its board of consultation at the time of his death. He was made a member of the faculty of the Harvard Medical School in 1905 and served for many years, being appointed professor of clinical medicine in 1930 and professor emeritus in 1935. He was a former vice-president of the National Tuberculosis Association, and at the time of his death was president of the Massachusetts Tuberculosis League. He was a fellow of the Massachusetts Medical Society and the American Medical Association and a member of the Association of American Physicians, the American Society for Clinical Investigation and the American Clinical and Climatological Association.

His daughter and two grandchildren survive him.

CORRESPONDENCE

URINARY FINDINGS BEFORE AND AFTER A MARATHON RACE

To the Editor: The accompanying chart of urinalyses, prepared by William T. Wright, chief technician of the John Hancock Mutual Life Insurance Company medical laboratory, may be of some clinical interest in depicting renal excretory reaction to the long-sustained effort involved in a twenty-six-mile race. Various other observers have made similar reports following athletic contests, and this chart is presented simply as additional corroborative evidence of normal kidney response to strenuous exercise.

Urine specimens were obtained both before and after the 1941 Boston marathon race from twenty participants — a fairly good number, considering the size of the starting list, the fact that some starters drop out, the physical condition of the runners at the finish, and the general confusion prevailing.

Several of the determinations were of little or no significance. Following the race, the color tended to be stronger, and the majority of specimens, which had previously been clear, were cloudy or hazy. All but three were acid before and after the race; and of the three that were very faintly alkaline before the race, two were acid afterward. The specimen from one contestant (No. 11) gave a faintly positive test with phenylhydrazine before the race, and that of another (No. 1) afterward. One (No. 8) showed a trace of acetone before the race, and two others (Nos. 16 and 20) showed 4 mg. per 100 cc. and a trace, respectively, afterward.

The chart is self-explanatory. The interesting features, of course, are the occurrence, following the race, of an incredible number of casts in most of the urines, as shown

Significant Urinary Findings before and after the 1941 Boston Marathon Race.

Contestant No.	Order of Finish	Specific Gravity		Albumin		Benedict's Test		Fermentable Sugar		Sediment	
		Before	After	Before	After	Before	After	Before	After	Before	After
					%			gm./100 cc.	gm./100 cc.		
1	2	1.022	1.030	0	0.10	0	H. gr. cl.	0.01	0.03	Normal	72 gran. and hyal. casts per l. p. f.
2	8	1.024	1.024	0	0.07	F. gr. cl.	H. gr. cl.	0.05	0.05	2 hyal. casts per slide	72 f. gran. and hyal. casts per l. p. f.
3	11	1.026	1.030	0	0.01	F. gr. cl.	H. gr. cl.	0.08	0.01	1 hyal. and 1 f. gran. cast per slide	116 gran. and hyal. casts per l. p. f.
4	23	1.023	1.025	0	0.08	F. haze	H. gr. cl.	0.04	0.02	1 hyal. cast per slide	30 f. gran. casts per l. p. f.
5	26	1.023	1.020	0	0.02	0	H. gr. cl.	0.03	0.02	Rare red blood cell	8 hyal. casts per l. p. f.
6	29	1.022	1.016	0	0.10	0	Gr. cl.	0.03	0.03	1 hyal. cast per slide	35 brownish gran. casts per l. p. f.
7	40	1.007	1.015	0	0.01	0	Gr. cl.	0.00	0.00	Many spermatozoa	1 f. gran. cast per slide, some spermatozoa
8	41	1.019	1.010	0	0.01	0	0	0.00	0.01	Very rare red blood cell	54 f. gran. and hyal. casts per l. p. f.
9	44	1.003	1.027	0	0.15	0	H. gr. cl.	0.00	0.07	Normal	30 f. gran. and hyal. casts per l. p. f.
10	49	1.022	1.032	0	0.25	F. haze	Yell. gr. cl.	0.04	0.08	1 hyal. cast per slide	450 gran. and hyal. casts per l. p. f.
11	52	1.028	1.028	0	0.01	H. gr. cl.	Yell. gr. cl.	0.06	0.02	Normal	12 brownish gran. casts per slide
12	54	1.025	1.025	0	0.05	0	F. haze	0.05	0.04	Normal	20 gran. casts per l. p. f.
13	59	1.027	1.032	0	0.32	F. haze	H. gr. cl.	0.03	0.02	Normal	Normal
14	60	1.024	1.033	0	0.40	0	H. gr. cl.	0.06	0.00	1 hyal. cast per slide, rare red blood cell	72 f. gran. and hyal. casts per l. p. f.
15	65	1.022	1.016	0	0.04	0	H. gr. cl.	0.08	0.01	4 hyal. casts per slide, rare spermatozoon	25 cellular (?) casts per l. p. f.
16	70+	1.030	1.030	0	0.04	F. haze	H. gr. cl.	0.10	0.01	Rare red blood cell	10 hyal. casts per slide
17	70+	1.007	1.024	0	0.03	0	F. gr. cl.	0.00	0.03	Normal	35 f. gran. and hyal. casts per l. p. f.
18	70+	1.010	1.016	0	0.04	0	H. gr. cl.	0.00	0.02	Normal	234 hyal. casts per l. p. f.
19	70+	1.008	1.016	0	0.03	0	H. gr. cl.	0.00	0.01	Normal	3 hyal. and 1 f. gran. cast per slide
20*	70+	1.015	1.018	.004	0.01	0	F. haze	0.08	0.06	Very rare spermatozoon	306 gran. casts per l. p. f.

Abbreviations: f. (Benedict's test) — faint; gr. — green; cl. — cloudy; h. — heavy; yell. — yellow; hyal. — hyaline; f. (sediment) — finely; gran. — granular; l. p. f. — low-power field.

*Ran only 11 miles.

by low-power microscopic field, and the consistent finding of albumin in varying quantities (0.01 to 0.04 per cent of albumin is equivalent to a very faint trace or faint trace as shown by the heat test or the nitric acid ring test). It should be noted that no red blood cells were found. Interesting, too, are the reactions to Benedict's test after the race, some of which might be interpreted as showing considerable sugar, although the actual quantity of fermentable sugar was extremely small in all cases (the fermentable-sugar percentage was determined by comparison of picramic acid colorimetric readings both before and after fermentation of the urine and not by the ordinary saccharometer, which is of questionable accuracy). Only one contestant (No. 2) furnished a subsequent specimen, which was procured four weeks later during a rest period while in training for a twenty-mile race; this urine was entirely normal, both chemically and microscopically.

ROLAND A. BEHRMAN, M.D.
Associate Medical Director

John Hancock Mutual Life Insurance Company
Boston

MISCELLANY

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR SEPTEMBER, 1941

DISEASES	SEPTEMBER 1941	SEPTEMBER 1940	FIVE-YEAR AVERAGE*
Anterior poliomyelitis	67	14	37
Chicken pox	106	105	83
Diphtheria	10	7	13
Dog bite	1197	955	895
Dysentery, bacillary	110	17	22
German measles	28	18	22
Gonorrhea	403	391	484
Measles	168	211	114
Meningitis, meningococcal	8	4	3
Meningitis, other forms	2	—	—
Mumps	233	125	122
Paratyphoid fever	2	3	10
Pneumonia, lobar	107	135	119
Scarlet fever	246	128	144
Syphilis	361	403	429
Tuberculosis, pulmonary	248	251	235
Tuberculosis, other forms	26	32	26
Typhoid fever	7	5	12
Undulant fever	8	9	4
Whooping cough	546	474	471

*Based on figures for preceding five years.

GEOGRAPHICAL DISTRIBUTION OF CERTAIN DISEASES

Anterior poliomyelitis was reported from: Attleboro, 2; Barnstable, 1; Billerica, 1; Boston, 9; Brockton, 2; Cambridge, 3; Danvers, 1; Fall River, 2; Falmouth, 2; Fitchburg, 1; Hanson, 1; Haverhill, 1; Lakeville, 1; Lynn, 1; Manchester, 1; Medford, 1; Melrose, 2; Merrimac, 1; Middleborough, 1; Natick, 2; New Bedford, 3; Newton, 2; North Attleborough, 2; North Brookfield, 1; Salem, 1; Sharon, 1; Somerville, 2; Southwick, 1; Spencer, 1; Springfield, 2; Sterling, 1; Stoneham, 1; Swansea, 2; Taunton, 1; Wareham, 1; Watertown, 1; Westwood, 1; Wilbraham, 1; Williamstown, 1; Worcester, 5; total, 67.

Diphtheria was reported from: Fall River, 9; Somerville, 1; total, 10.

Dysentery, bacillary, was reported from: Boston, 2; Danvers, 6; Dunstable, 91; Fairhaven, 1; Lowell, 1; Northampton, 1; Watertown, 1; Winchester, 1; Worcester, 6; total, 110.

Infectious encephalitis was reported from: Fall River, 1; Worcester, 1; total, 2.

Meningitis, meningococcal, was reported from: Chicopee, 1; Easthampton, 1; Fort Devens, 1; Framingham, 1; Ipswich, 1; Manchester, 1; Quincy, 2; total, 8.

Meningitis, other forms, was reported from: Cambridge, 1; Lowell, 1; total, 2.

Paratyphoid fever was reported from: Boston, 1; Brookline, 1; total, 2.

Pellagra was reported from: Boston, 2; Fall River, 1; total, 3.

Rocky Mountain spotted fever was reported from: Quincy, 1; total, 1.

Septic sore throat was reported from: Fall River, 1; Boston, 1; total, 2.

Tetanus was reported from: Brockton, 1; total, 1.

Trachoma was reported from: Worcester, 1; total, 1.

Trichinosis was reported from: Boston, 4; Fall River, 1; Medford, 2; Middleborough, 1; total, 8.

Typhoid fever was reported from: Chicopee, 2; Fall River, 1; Marblehead, 1; Scituate, 1; Winthrop, 1; Woburn, 1; total, 7.

Undulant fever was reported from: Carver, 1; Leominster, 1; Newburyport, 1; Northampton, 1; Pittsfield, 1; Somerville, 1; Templeton, 1; Webster, 1; total, 8.

Anterior poliomyelitis has increased slowly this season but has not reached epidemic proportions.

Meningococcal meningitis, pulmonary tuberculosis, scarlet fever, undulant fever and whooping cough were above the five-year averages.

Chicken pox, German measles, measles, mumps, scarlet fever and whooping cough, although slightly above the five-year averages, have shown the usual seasonal declines.

Dog bite not only has shown the usual seasonal increase but has reached record high figures for the month.

Bacillary dysentery has shown a steady increase this summer and has reached record high proportions for September.

Diphtheria, gonorrhea, lobar pneumonia, paratyphoid fever, typhoid fever and syphilis were below the five-year averages.

NOTES

Award of the Louis E. Kirstein Fellowship to Dr. Sidney Cohen, A.B. '33, M.D. '37, assistant in medicine and in bacteriology, was among the grants of $5925 at the Harvard Medical School for the current academic year recently announced by Harvard University. This fellowship, to promote "scientific medical education," was established through a gift made to Harvard University by eighty-nine friends of Mr. Kirstein in honor of his seventieth birthday and in recognition "of their affection for him as a man and their admiration of him as a humanitarian." Kenneth T. Bird, 4M, of Watertown, was awarded the James C. Melvin Scholarship. National Scholarship renewals were awarded to James S. Clarke, 2M, of La Grange, Illinois; Martin E. Flipse, 2M, of Douglaston, Long Island, New York; Winsor C. Schmidt, 2M, of Rye, New York; Louis E. Ward, 3M, of Mt. Vernon, Illinois; Allan L. Friedlich, Jr., 3M, of New York City; Glen R. Leymaster, 4M, of Aurora, Nebraska; Clarke T. Case, 4M, of Pyinmana, Burma; and Laurence G. Wesson, Jr., 4M, of Boston.

Dr. Bennett F. Avery, dean of Boston University School of Medicine, recently announced that the Samuel Gold Award, presented annually to the school's outstanding first-year student by Phi Lambda Kappa fraternity, has been given to Sarkis A. Sarkisian, of Bridgewater.

NOTICES

ANNOUNCEMENTS

DR. RALPH H. HOPKINS announces the removal of his office from the Hotel Westminster, Boston, to 31 Bay State Road.

DR. DAVID W. WELLS announces the removal of his office from the Hotel Westminster, Boston, to 31 Bay State Road.

BOSTON MEDICAL HISTORY CLUB

There will be a meeting of the Boston Medical History Club at the Boston Medical Library, 8 Fenway, on Wednesday, November 19, at 8:15 p.m. Dr. Arturo Castiglioni will speak on "Giovanni Battista Morgagni: In relation to the evolution of medical thought in the eighteenth century."

All interested persons are cordially invited to attend.

ROBERT DAWSON EVANS MEMORIAL LECTURE

Dr. Alvah H. Gordon, professor of medicine emeritus at McGill University Faculty of Medicine, Montreal, will give the first in the series of Robert Dawson Evans Memorial Lectures on Friday, November 21, at 8:15 p.m., in the Evans Auditorium, 78 East Concord Street, Boston. His subject will be "Bone Changes in Certain Medical Diseases."

Physicians and medical students are cordially invited to attend.

BOSTON SOCIETY OF BIOLOGISTS

A meeting of the Boston Society of Biologists will be held at the Harvard Biological Laboratories, Divinity Avenue, Cambridge, on Wednesday, November 19, at 8 p.m.

PROGRAM

Chronic Gonadotropin and Luteal Secretion in Primates. Dr. Frederick L. Hisaw.

On Seasonal Changes in the Testes of Deer and Their Relationship to the Growth of Antlers. Dr. George B. Wislocki.

Biochemical Aspects of Antler Growth. Dr. Joseph C. Aub, Miss Regina McLean and Miss Dorothy M. Tibbetts.

WALTHAM MEDICAL MEETING

The regular clinicopathological staff conference of the Metropolitan State Hospital will be held at the hospital on Wednesday, November 26, at 8 p.m. Two cases of diabetes will be presented by Drs. Clementine McKeon, Richard C. Wadsworth and Elvin V. Semrad, and will be discussed by Dr. Alexander Marble.

All interested physicians are cordially invited to attend.

MASSACHUSETTS SOCIETY OF EXAMINING PHYSICIANS

The Massachusetts Society of Examining Physicians will have its fall meeting and dinner on Wednesday evening, December 3, at 6:30 p.m., at the Copley-Plaza, Boston.

Dr. J. Grafton Love, of the Neuro-Surgical Department, Mayo Clinic, Rochester, Minnesota, will present a paper entitled, "Protruded Intervertebral Disks: A common cause of disabling backache and sciatic pain," which will be illustrated with lantern slides and motion pictures. Dr. W. Jason Mixter, chief of the Department of Neuro-Surgery, Massachusetts General Hospital, and Dr. Gilbert E. Haggart, chief of the Section of Orthopedic Surgery, Lahey Clinic, will discuss the paper.

NEW ENGLAND HEART ASSOCIATION

The next meeting of the New England Heart Association will be held on Monday, November 24, at 8:15 p.m., at the Massachusetts General Hospital.

PROGRAM

Pulmonary Embolism and the Electrocardiogram. Drs. Donal Murnaghan, Sylvester McGinn and Paul D. White.

Follow-Up Study of Cases of Chronic Constrictive Pericarditis. Drs. Marlow B. Harrison and Paul D. White.

Phonocardiography. Dr. Howard B. Sprague and Mr. Maurice B. Rappaport.

Follow-Up Study of Uncomplicated Systolic Murmurs at the Cardiac Apex or Aortic Valve Area. Drs. Lyle Baker, Howard B. Sprague and Paul D. White.

Clinicopathological Study of Marked Coronary Disease. Drs. Reno R. Porter and Edward F. Bland.

Interested physicians and medical students are cordially invited to attend.

NEW ENGLAND SOCIETY OF PHYSICAL MEDICINE

A meeting of the New England Society of Physical Medicine will be held on Wednesday, November 19, at 8 p.m., at the Danvers State Hospital, Hathorne, Massachusetts.

PROGRAM

Introductory Remarks. Dr. Clarence Alden Bonner, superintendent, Danvers State Hospital.

Neuropsychiatric Clinic, with a Discussion of Indications for Physical Medicine. Presentation of cases of multiple sclerosis, Raynaud's disease, parkinsonism, manic-depressive psychosis and schizophrenia. Dr. Leo Maletz, clinical director, Danvers State Hospital.

All members of the medical profession are cordially invited to attend.

AWARD BY THE AMERICAN UROLOGICAL ASSOCIATION

The American Urological Association offers an annual award, not to exceed $500, for an essay (or essays) on the result of some specific chemical or laboratory research in urology. The amount of the award is based on the merits of the work presented, and if the Committee on Scientific Research considers none of the offerings worthy, no award will be made. Only residents in urology in recognized hospitals and physicians who have practiced urology for not more than five years may compete.

Essays should be in the hands of the secretary, Dr. Clyde L. Deming, 789 Howard Avenue, New Haven, Connecticut, on or before April 1, 1942.

UNITED STATES CIVIL SERVICE EXAMINATIONS

Health-Education Consultants, $2600 to $3800 a Year

To assist state, county and local health officers in dealing with problems incident to the rapid growth in industrial and governmental production and the consequent unusual concentration of population and increasing health problems, the United States Public Health Service is planning to appoint health-education consultants to various defense areas. The positions, paying $2600 to $3800 a year, will be filled through open competitive examinations, and the United States Civil Service Commission has just issued the examination announcement. A written test will not be given, but applicants will be rated on their qualifications as shown in their applications and corroborative evidence.

Appointees will work with local health officers and their staffs, advising them regarding methods of health education, such as individual instruction through interview, group instruction through discussions, talks, lectures and other educational technics. To qualify for the positions, applicants must have completed a four-year college course, including or supplemented by special study — or for the assistant grade, experience — in public health. In addition, they must have had experience in public-health education work co-ordinating the activities of all organized health groups in a community for the purpose of promoting a public-health program. This experience must have been in a federal, state or official local public-health department or in a voluntary agency, such as the American Red Cross or the National Tuberculosis Association.

Applications must be filed with the Civil Service Commission in Washington, D. C., not later than December 11, 1941. The examination announcement giving detailed requirements can be consulted or obtained at any first-class or second-class post office or at the central office in Washington.

EXAMINATIONS FOR APPOINTMENTS IN THE MEDICAL CORPS OF THE UNITED STATES NAVY

Examinations for appointment as assistant surgeon (lieutenant, junior grade), United States Navy Medical Corps, will be held at all the large naval hospitals and the Naval Medical Center, Washington, D. C., on January 5 to 9, 1942, inclusive.

Applicants for appointment as assistant surgeon must be citizens of the United States, more than twenty-one but less than thirty-two years of age at the time of acceptance of appointment, and graduates of Class A medical schools who have completed at least one year of intern training in a hospital approved by the Council on Medical Education and Hospitals of the American Medical Association.

Examinations for appointment as acting assistant surgeon for intern training in naval hospitals accredited for intern training by the Council on Medical Education and Hospitals of the American Medical Association will also be held on January 5 to 9, 1942, inclusive. Applicants for appointment as acting assistant surgeon for intern training must be citizens of the United States, more than twenty-one but less than thirty-two years of age, and members of the junior or senior classes in Class A medical schools. After twelve months of intern training, acting assistant surgeons may apply for appointment as assistant surgeons in the United States Navy.

A circular of information regarding these examinations, physical requirements, rates of pay and promotion and retirement data may be obtained from the Bureau of Medicine and Surgery, Navy Department, Washington, D. C., on request. Applications for authorization to take the examination must be received at the Bureau of Medicine and Surgery three weeks before the examination.

Medical officers of the United States Navy are encouraged to develop a specialty, and are assigned, if their interest in the specialty warrants such action, to postgraduate instruction in the large naval hospitals, the Naval Medical Center, Washington, D. C., and civilian medical centers. Some of the specialties in which medical officers may seek qualifications are: surgery, medicine, ophthalmology, otolaryngology, roentgenology, laboratory, pathology, public health, psychiatry, deep-sea diving, aviation medicine (flight surgery), gas warfare, tropical medicine, medical research and so forth.

SOCIETY MEETINGS AND CONFERENCES

Calendar of Boston District for the Week Beginning Sunday, November 16

Monday, November 17

12:15–1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

Tuesday, November 18

*9:00–10:00 a.m. Medical clinic. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

12:00 m. Treatment of Epilepsy. Dr. H. Houston Merritt. South End Medical Club. Headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston.

12:15–1:15 p.m. Clinicoroentgenological conference. Peter Bent Brigham Hospital amphitheater.

Wednesday, November 19

*9:00–10:00 a.m. Refractory Blood Diseases. Dr. C. W. Heath. Joseph H. Pratt Diagnostic Hospital.

*12:00 m. Clinicopathological conference. Children's Hospital.

4:30 p.m. New England Oto-Laryngological Society. Massachusetts Eye and Ear Infirmary, 243 Charles Street, Boston.

8:00 p.m. Boston Society of Biologists. Harvard Biological Laboratories, Divinity Avenue, Cambridge.

*8:15 p.m. Giovanni Battista Morgagni. Dr. Arturo Castiglioni. Boston Medical History Club. Boston Medical Library, 8 Fenway.

Friday, November 21

*9:00–10:00 a.m. Anemia and Hiatus Hernia. Dr. William P. Murphy. Joseph H. Pratt Diagnostic Hospital.

*8:15 p.m. Bone Changes and Certain Medical Diseases. Dr. Alvah H. Gordon. Evans Auditorium, Massachusetts Memorial Hospitals.

Saturday, November 22

*9:00–10:00 a.m. Blood Clinic. Dr. H. G. Brugsch. Joseph H. Pratt Diagnostic Hospital.

*Open to the medical profession.

November 17–19, 21–22, 27 and 30. Thomas William Salmon Memorial Lectures. Page 636, issue of October 16.

November 19. New England Society of Physical Medicine. Page 803.

November 24. New England Heart Association. Page 803.

November 26. Waltham Medical Meeting. Page 803.

December 3. Massachusetts Society of Examining Physicians. Page 803.

December 11. Pentucket Association of Physicians. Page 473, issue of September 18.

January 3. American Board of Obstetrics and Gynecology. Page 473, issue of September 18.

January 10–11. Forum on Allergy. Page 392, issue of September 4.

February 19–21. American Orthopsychiatric Association. Page 708, issue of October 30.

April 6–10. American Congress on Obstetrics and Gynecology. Page 600, issue of October 9.

April 8–11. American Academy of Physical Medicine. Hotel Statler, Boston.

April 20–24. American College of Physicians. Page 996, issue of June 5.

District Medical Societies

BERKSHIRE

April 30.

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